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ABSTRACT

Following two decades of growth, both enrollment and funding at the Texas State Technical Institute (TSTI) have declined sharply over the last 5 years. In April 1989, the TSTI initiated a strategic planning process incorporating a strategy based on meeting a clearly recognized and understood public need that is within the role, scope, and mission of TSTI. The planning process included meetings and interviews with business and industry leaders which revealed that, aside from the lack of capital, the shortage of quality technicians was the single most critical problem limiting their ability to expand present operations and open new facilities in Texas. To address this problem, and to help assure the future success of TSTI and the economic well-being of Texas, six strategic planning goals were identified: (1) maintaining and increasing quality through exemplary technical programs; (2) providing statewide student access to TSTI programs through distance learning, the enrollment of special population groups, and the development of instructional alternatives for worker retraining; (3) establishing an articulated technical education and training system with secondary schools and four-year colleges; (4) maintaining an educational delivery system supportive of Texas economic development; (5) creating a management structure and culture supportive of responsive decision making; and (6) pursuing resource attainment and image development for institutional "world class" status. This strategic planning report includes an examination of the Texas economy and its role in international trade, reviews TSTI assets, profiles its students, reviews the institutional mission, lists programs offered, and includes a 62-item bibliography. (JMC)

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A Strategic Plan for Texas State Technical Institute

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The Technical College System of Texas

JC 910 174

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An Open Letter to the Citizens of Texas

A new decade brings promises of new horizons of potential for Texas and for its technical college system, Texas State Technical Institute. Grasping hold of the potential and turning it into opportunity is the aim of this strategic planning document. Strategic planning is critical to Texas as our state responds and adjusts to changing conditions and issues, both from within and without, and TSTI, as the state's leader in technical education, is an important planning participant.

This document is a tangible sign of the commitment that the Board of Regents and the staff of TSTI have to the people of Texas to provide them with exceptional opportunities in technical education. With it we send the message that we have faith not only in ourselves, but in the "community of Texas to use innovation, creativity and hard work to focus on the future.

It is important to bear in mind that this document is the result of a collective effort. From the inception to the publication, it has involved the time, talent and energy of many dedicated members of the TSTI team. While this page of acknowledgement does not do adequate justice to those individuals involved, it does give me the opportunity to mention a few who have been instrumental in creating this Strategic Plan.

My sincerest thanks to the members of the TSTI Board of Regents, and the members of the Management Council who participated in the planning stages, and to the members of the TSTI Development Foundation, Inc., and TSTI Advisory Committees for their continued support.

I am also grateful to the faculty, staff, and students of the TSTI System for their valuable ideas and to the many leaders of Texas industry and business who met with me to discuss the work force needs of their companies.

My thanks also to the members of the TSTI System staff who produced this document. In particular, Alexandra Test, who served as project coordinator and editor, Gary Hendricks and Teresa Isbell, both of TSTI System Research, Pamela Sharp and Frances Alcorn, both of TSTI System Public Information. Also to Maurice Dutton, Ph.D., who assisted in analyzing the abundance of data gathered for this document.

On behalf of the members of the TSTI Board of Regents I am proud to present this document to the State of Texas.

Sincerely,

Cecil L. Groves

Cecil L. Groves, Ph.D.
Chancellor
TSTI System

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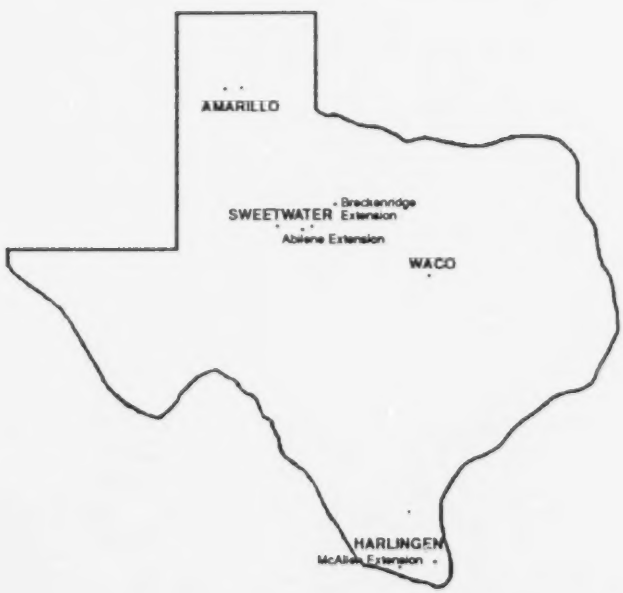
Texas State Technical Institute will be a "world-class" collegiate leader in technical education offering Texas and all Texans unique learning opportunities designed to maximize student acquisition of knowledge, values, attitudes and skills needed for the development of a "quality work force."



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Executive Summary

Early in the process, it was agreed that a strategic plan designed for TSTI must be based on more than a self-serving motivation. To be effective, the strategy must be based upon meeting a clearly recognized and understood public need which is within the role, scope, and mission of TSTI.

Overview

Texas State Technical Institute, founded in 1965, has been an important positive factor influencing the economic growth and development of Texas for the past 25 years. Legislatively mandated to offer one and two year college programs in highly specialized technical and vocational fields, TSTI graduates are eagerly sought after by business and industry. TSTI graduates populate the work floor of research laboratories, advanced production facilities, and the service industries throughout Texas and the United States.

The success of our graduates can be largely attributed to the intensity of their educational experience at TSTI which requires extensive laboratory hours and a student work week (classroom and laboratory hours) significantly exceeding the traditional associate degree models.

While prospering both in enrollment and funding for the first two decades of its existence, the past five years have seen a decrease in both enrollment and funding. For TSTI to fulfill its mandated mission, it became clear that decisive action was required and that a vigorous strategic plan must be developed and implemented.

Developing the Plan

Early in the process, it was agreed that a strategic plan designed for TSTI must be based on more than a self-serving motivation. To be effective, the strategy must be based upon meeting a clearly recognized and understood public need which is within the role, scope, and mission of TSTI.

Beginning in April 1989, TSTI began an intensive planning effort to develop a needs-based strategic plan. Numerous meetings were held with the Board of Regents; Industrial Foundation members; faculty, staff, and students; business and industry advisors; and with key agency and institutional leaders for the purpose of seeking input and counsel. The thrust of the planning process was to develop a macrostrategy for TSTI based on a vision supported by specific goals and strategic objectives.

Considerable time was spent in defining the larger problems or needs Texas must address and in carefully assessing the responsive capacity and capability of TSTI. Lists of institutional assets and liabilities for TSTI were compiled and reviewed, the prior history of the institution studied and critiqued, opportunities for service and support identified and discussed, and future directions examined and debated.

The primary document, *A Strategic Plan for Texas State Technical Institute,* is a narrative-based planning tool designed to facilitate the development of outcome-specific plans. This document is specifically designed to target those initiatives and activities most supportive of Texas businesses and industries which compete in the national and international markets for the sale of goods and services. While not specifically stressed in the plan, service-based industries such as food service, nursing, and interior design remain a vital commitment for TSTI.

Work Force Needs

Most economists, public policy makers, and business and industry leaders agree that the economic recovery of Texas must be based upon the diversification of business and industry, with manufacturing and exports increasing in importance. The "Strategic Economic Plan for Texas" developed and published in 1989 by the Texas Strategic Economic Policy Commission observed that only two out of ten Texas companies which could export goods choose to do so. Manufacturing in Texas accounts for approximately $50 billion or 16% of our gross state product. Texas needs to significantly expand its manufactruing segment in order to ensure success of diversification efforts.

The initial commitment of Texas to support the expansion of manufacturing export-based businesses resulted in the strengthening of the research capacities of its major universities. Funding for "centers of excellence" in such areas as aerospace, superconductivity, and biotechnology has been provided. This initiative has been successful, resulting in the location of several significant projects in Texas such as the Superconducting Super Collider, MCC and SEMATECH. However, the efforts to commercialize the informational and knowledge products from public and private research universities and laboratories has not been as successful. Interviews and discussions with business and industry leaders revealed that, besides the lack of capital, the shortage of quality technicians is emerging as the single most critical

Interviews and discussions with business and industry leaders revealed that, besides the lack of capital, the shortage of quality technicians is emerging as the single most critical problem limiting their ability to expand present operations or open new facilities in Texas.

problem limiting their ability to expand present operations or open new facilities in Texas. The recent decision of American Airlines to establish a major repair terminal in Fort Worth, the growth of the petrochemical industry along the coast of Texas, the expansion of the semiconductor manufacturing initiatives in Texas, and the proposed construction of the Superconducting Super Collider have dramatically called attention to the lack of a qualified pool of technical workers in Texas. Unless mitigated by a sizeable immigration of workers from other states and countries, Texas will not be able to accommodate present or projected needs for technical workers. Ironically, Texas does possess a significant natural resource advantage over most other states, a positive population growth; however, the capabilities of that indigenous work force are compromised by a serious literacy gap.

Technical education in Texas suffers from an image problem caused by a lack of information and, in many cases, misinformation.

Similar concerns were expressed by the Governor's Task Force on Vocational Education in its January 1988 report and by the Texas Strategic Economic Policy Commission in its report in January 1989. Capsuling the findings of these studies and others, the following key issues were identified:

- There is an emerging shortage of technicians in Texas which threatens to hamper the growth and recovery of business and industry.

- A new type of technician who possesses advanced cognitive and interpersonal skills as well as essential physical skills is needed for Texas to be globally competitive.

- Public school graduates are believed generally lacking in cognitive and interpersonal skills as well as in an acceptable work ethic. The same lack of skills can be found in many graduates and attendees of one and two-year programs.

- There is a lack of transfer opportunities to four-year engineering technology and technology-intensive degree programs for graduates of two-year applied science and arts programs, which discourages prospective students from seeking a technology oriented degree and career.

- Technical education in Texas suffers from an image problem caused by a lack of information and, in many cases, misinformation.

- The Governor's Task Force on Technical

Education observed, "Texas has a largely disarticulated system with each entity pursuing its own objectives, some of which reflect local entrepreneurial ambitions more than educational objectives, and not necessarily what is best for the entire State of Texas."

- Present methods of instructional delivery make little use of the advantages offered through the applications of new technologies (e.g., laser disc, computer-interactive systems) to enhance student learning, not to mention the potential cost savings.

- Most Texas secondary schools do not provide students access to or knowledge of emerging technologies and the opportunities for employment both now and in the future.

- Increased use of computers and telecommunications by industry requires graduates to have a systems-orientation (e.g., electrical, mechanical) with a broad-based knowledge as well as a higher order of learning skills which go beyond simple recollection and recognition.

This list of concerns or needs is by no means complete but it does present some of the more critical issues.

TSTI Potential

It was found that Texas State Technical Institute is a unique post-secondary educational institution—a technical college—with a program format and design decidedly different from other institutions which offer two-year or four-year degrees. Some descriptors follow which better illustrate the primary differences.

TSTI students are required to be in class and in the laboratory nearly twice as long (26 to 32 hours a week) as students attending other collegiate institutions in Texas. These same students are generally younger and enrolled on a full time basis (81% attend full-time). TSTI students come from throughout the state (245 of 254 counties, Fall 89), the majority of which assume residence either on campus (28.5% live on campus as compared to 28% for Texas A&M) or in nearby apartments and houses.

Most (51%) of TSTI students come from small towns with populations of less than 25,000 while less than 7% of the students come from cities with populations greater than 150,000. The graduation

It was found that Texas State Technical Institute is a unique post-secondary educational institution —a technical college— with a program format and design decidedly different from other institutions which offer two-year or four-year degrees.

or completion rate of TSTI students is very high (34%) as compared with other collegiate institutions which range from around 20% to 5% or lower. The intensity of technical education and training offered students by TSTI is a major asset for Texas business and industry who desire employees with higher skill levels and the attitudes and values essential to become work floor and workplace leaders in the future.

The following TSTI limitations, which affect our ability to respond to the previously identified work force needs, were noted: (1) the lack of public information about TSTI and what it provides, (2) the need to replace WWII facilities used for instruction, (3) the difficulty in serving the primary urban areas, (4) the need for funding to start new programs and retool existing programs, (5) transfer opportunities for graduates, (6) lack of scholarship funds for students, and (7) inadequate student housing. The preceding list is not inclusive but reflects the more immediate needs.

On the other hand, the following TSTI assets were identified: (1) active participation of business and industry leaders through the College Foundation (75 members) and Advisory Committees (1600 members); (2) being a single purpose technical college system capable of targeting resources; (3) the "critical massing" of people (over 600 technical faculty), resources (four campuses and three centers), and programs; (4) existing special purpose facilities such as the TSTI-Waco Airport and the Amarillo Industrial Park; (5) a laboratory intensive curricula based on industry-standard equipment, processes, and work expectations of students; (6) access on campus to low-cost student housing; and (7) the excellent reputation enjoyed by TSTI graduates among industry and business leaders. While there are many other key assets TSTI possesses, the preceding are representative.

The mission statement for TSTI is stated in the form of a vision, for it reflects more than TSTI's full potential; an image that is dynamic and requires constant growth on the part of all persons who become a part of this vision.

TSTI will be a "world-class" collegiate leader in technical education offering Texas and all Texans unique learning opportunities designed to maximize student acquisition of knowledge, values, attitudes, and skills needed for the development of a "quality work force."

Goals and Strategic Objectives

In support of the economic development of Texas, the following goals have been selected. These goals provide the focus and direction for the strategic objectives which in turn specify what is to be done for the goals to be achieved and for the vision to become a reality.

I. Quality: Exemplary Technical Programs, Services and Instruction

Quality is fundamental to all programs, services, and instruction offered or provided by TSTI. With its "critical massing" of technical facilities, personnel, programs, and equipment and its long history of graduating outstanding technicians, TSTI retains the potential to offer Texas and Texans a unique advantage over other states and institutions.

A. **Prototype Instructional Laboratories and Studios** featuring computer- and telecommunications- based hardware and software configurations (e.g., distributed networks) which are supportive of export-based industries and businesses will be provided.

B. **Emerging and Advanced Technical Programs,** courses, and modules supportive of Texas industry and business needs will be developed and existing curricula will be updated.

C. **Excellence in Service Sector Programs** (e.g., health, food service) designed to facilitate increasing competitiveness through quality care, service and support will be achieved.

D. **Enhanced Student Learning Opportunities** which integrate learning theory with instructional technology will be developed.

E. **Acknowledged Excellence and Quality** for instructional programs and services will be attained.

II. Opportunity: Statewide Student Access to TSTI Programs and Services.

Opportunity to access quality technical education and training for all Texas citizens is a primary goal. As the largest residential two-year public technical college, TSTI offers a unique advantage and asset

for Texas in providing student access to quality technical education.

A. **Distance Learning Opportunities** will be provided through the use of alternative instructional delivery systems such as those which are technologically-based.

B. **Enrollment of Special Population Groups** (e.g., minorities, disabled, displaced homemaker) will be supported, encouraged, and their success facilitated.

C. **Instructional Alternatives and Improvements** will be provided for retraining employees and displaced workers.

III.Cooperation: An Articulated Technical Education and Training System for Texas.

Cooperation and curricula articulation are needed between and among secondary and post-secondary education institutions if Texas is to quickly martial technical training resources to meet industry demands. TSTI will facilitate cooperation and articulation through alliances and agreements with other institutions and the establishment of networked (human and electronic) services responsive to business and industry demands.

A. **Secondary School Cooperation** and contracting (e.g., testing, instruction) will be done and supported for the purpose of improving access to quality technical education.

B. **Community College Cooperation** for programs and services will be sought and supported where benefits accrue to the students and to the taxpayers of the state.

C. **Four-Year Colleges and Universities** cooperative and collaborative programs and services will be established and supported.

D. **Networked Human and Electronic Resources** will be designed to facilitate greater exchange of information internally and externally between and among individuals, organizations, and agencies.

IV.Commitment: An Educational Delivery System Supportive of Texas Economic Development.

TSTI is well positioned by campus location; legislative mandate; historical commitment and experience; and available facilities, equipment, and personnel resources to assist, facilitate, and lead in the economic development of Texas.

A. **Specific Competitiveness Improvement** efforts supportive of Texas business and industry as well as local, regional, and state economic development efforts (e.g., TSTI-Waco Airport, TSTI-Amarillo Industrial Park, South Texas Advanced Technology Training Center) will be initiated and supported.

B. **Applied Academics and Workplace Literacy** instructional modules, materials, and learning environments will be acquired or developed for full-time and part-time students and for customized business and industry training and retraining.

C. **Work Floor and Workplace Oriented Applied Research** and Development efforts associated with the commercialization of research and improved competitiveness will be initiated and supported.

D. **Itinerant Technology Infusion, Technology Transfer**, and training opportunities for small and mid-sized businesses and rural economic development will be provided.

E. **Responsive Technical Education and Technical Assistance** will be used to support the development and expansion of existing businesses and industries (primarily small and mid-sized) and to attract new industries.

V.Management: An Organizational Structure and Culture Supportive of Responsive and Responsible Decision Making.

The TSTI organizational culture will support an action-oriented approach to management which stresses accountability of personnel as well as

programs and an orientation to maximize responsiveness to "quality work force" needs for economic development.

A. **An Organizational Structure** supportive of responsive decision making and effective use of resources will be developed.

B. **Institutional Policies and Procedures** will be consistent and complete to assure compliance with federal, state, and board mandates as well as their system wide implementation.

C. **A Positive Working Environment** for TSTI personnel will be stressed which supports creativity, teamwork, problem-solving, and, most importantly, a student-oriented faculty and staff.

D. **Resource Management** (e.g., financial, facilities, personnel) **practices** stressing responsible asset management will be required.

VI. Investment: Resource Attainment and Image Development for Institutional "World-Class" Status.

TSTI offers Texas taxpayers, businesses and industries an undervalued and unrecognized asset which, with a modest investment in resources, can provide Texas and Texans a unique educational asset and a global marketplace competitive advantage.

A. **Foundational support (e.g., donations, gifts)** for scholarships, instructional program excellence, facilities and equipment will be secured.

B. **Supplementary Resource Development** to the State funded education and general (E&G) budget will be secured through grants, contracts, and other sources.

C. **An Agenda for Legislative Funding** and Coordinating Board resource allocation will be developed which supports attainment of the institutional vision statement.

D. **Technical Education and TSTI Image Development** will be stressed.

Combined and considered as an economic development package for Texas, the goals for TSTI of Quality, Opportunity, Cooperation, Commitment, Management and Investment add up to a significant competitive advantage in the global marketplace.

The Vision

Strategic Outcomes

With implementation of the preceding goals and strategic objectives, several strategic outcomes will result for TSTI and Texas. These outcomes are focused upon meeting the economic development needs of Texas.

1. A positive image for technical education and TSTI will be achieved through development and implementation of a detailed marketing plan designed to emphasize the value and importance of technical careers and technicians as critical to Texas' economic future.

2. Prototype instructional laboratories and studios will be established featuring computer and telecommunications-based hardware and software configurations networked internally and externally (e.g., distributed manufacturing), to give students experience in working with integrated systems. These also will provide Texas a technical education showcase and the opportunity to disseminate this model to other institutions.

3. Commercialization efforts by research universities and other agencies of scientific discoveries and patentable research will be facilitated in cooperation with TSTI by utilizing the prototype laboratories as beta test sites. This also will provide technical students with enhanced learning experiences (e.g., assessment, evaluation, analysis) and faculty the opportunity for professional development.

4. The pool of qualified minority technicians for Texas will be expanded through an increased number of graduates from TSTI resulting from a focused effort to recruit minority students and improve the retention rates in technical programs.

5. TSTI will work cooperatively and collaboratively with existing public and private educational institutions located in requesting communities that do not have a TSTI facility to provide effective, efficient, and cost-effective technical education.

6. Applied academic instructional options (e.g., Principles of Technology, Applied Math) will be provided to students desiring a hands-on approach to learning. This will be an alternative to the more traditional classroom and

laboratory courses which utilize more theoretical and passive methods.

7. **Technology enhanced education alternatives** will be developed and disseminated which utilize technologies (e.g., laser-disc/touch-screen interactive systems, video-tape/computer-managed instruction) supportive of sound instructional practices.

8. **Human and digitally-based electronic networks** will be implemented internally and externally to facilitate information exchange among and between individuals, programs, agencies, and organizations on matters supportive of technical education and training.

9. **Technology transfer, technology infusion, technical assistance,** and employee training and retraining for small and mid-sized businesses and industries will be provided by TSTI through an itinerant instructional delivery system.

10. **"Critical massing" of resources**—faculty, facilities, programs, equipment, and information—will permit TSTI and Texas to achieve national leadership in key technical areas such as aerospace technologies, manufacturing technologies, materials technologies, laser electro-optic technologies, chemical technologies, and environmental technologies at the two-year level.

11. **Rural economic development** will be assisted by TSTI through special initiatives like the Rural Technology Assistance Center and by specific projects which offer opportunities for economic diversification, such as the development of electronic and textile product manufacturing opportunities, using computer integrated and controlled processes.

12. **Centers for competitiveness** in different program clusters will be established to teach and present the latest work floor and workplace applications, processes, and procedures designed to improve productivity and competitiveness.

In Summation

Texas State Technical Institute, with its four campuses and three extension centers, is ideally positioned to provide Texas with superior technical educational programs and facilities which focus on economic development and which provide a showcase evidencing a commitment to quality technical education. States such as Oklahoma, Indiana, Ohio, Georgia, New Jersey, Pennsylvania, North and South Carolina, and others have invested heavily in their technical education and training systems, creating centers of technical excellence and constructing showcases of technology to attract and expand business and industry. Texas must respond to these challenges now or be willing to pay a much higher price later.

A Strategic Plan

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The Vision - Present and Past

"We have many pluses in Texas and the TSTI System is chief among them. TSTI's ability to provide specific technical and vocational training and retraining is a selling point that we should promote."

William P. Clements
Governor of the State of Texas

Vision

The future that the men and women who created TSTI saw for the college was visionary. The message Governor John B. Connally gave April 5, 1965, is as significant today as it was almost 25 years ago:

"In my opinion the Connally Air Force Base site offers the best possible location for a top quality, state operated, modern, model vocational-technical institute with educational programs tailored to meet the present and future needs of Texas industry. This would be an institution offering advanced and technical courses not presently available in all areas of the State. It is centrally located not too distant from the metropolitan complexes of Dallas-Fort Worth, Houston and San Antonio. In these areas are found the aircraft, electronic, and space-related industries which demand sophisticated training in complex subjects. Here, too, are located the laboratories of the petrochemical industry, as well as major airline depots, the textile and clothing industry and many other businesses and concerns requiring highly trained employees."

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Past as Prologue

Texas State Technical Institute (TSTI) is poised at a historical crossroads. Celebrating its 25th anniversary in 1990, TSTI has served Texas and Texans well. It has been a leader in vocational and technical education at the state and national levels and a good friend of Texas business and industry.

In preparing for the future, it is always instructive to review the past to gain a perspective of those forces and factors which influenced the past in order to better understand those likely to affect the future.

...TSTI has served Texas and Texans well. It has been a leader in vocational and technical education at the state and national levels and a good friend of Texas business and industry.

A Brief Historical Perspective

From the very beginning, TSTI was born to address an economic problem. The creation of the TSTI System (James Connally Technical Institute) resulted from the closing of the James Connally Air Force Base in Waco and subsequent closings of other air bases in Texas. Faced with the loss of jobs and revenue, Texas State Technical Institute was created to fill that void and help in preparing Texans for the new businesses and industries which would emerge in the 1970's and 80's.

Founded under the auspices of Texas A&M University, and with its guidance and early direction, the following emerging and advanced technical and vocational programs were proposed in an article printed in the Waco Times-Herald on April 5, 1965.

1. *Programs for general industry and business.*
   a. *Installation and maintenance of automated systems.*
   b. *Business data processing.*
   c. *Industrial electronics technicians.*
   d. *Quality control technicians.*
   e. *Instrumentation technicians.*
   f. *Non-destructive testing technicians.*
   g. *Materials inspectors.*
   h. *Diesel technicians.*
   i. *Specialty draftsmen.*
2. *Programs to supply technical assistants for general engineering and the construction industry.*
   a. *Surveying.*
   b. *Field and laboratory materials inspection.*
   c. *Field inspectors.*
   d. *Draftsmen.*
   e. *Estimators.*

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3. *Programs for the health industries, including medical laboratories.*

   a. *Laboratory medical technicians.*
   b. *X-ray technicians.*
   c. *Health physics technicians.*
   d. *Hospital maintenance personnel.*
   e. *Medical electronics technicians.*

4. *Programs to supply technical assistants for industrial and university research laboratories, both public and private.*

   a. *Glass blowing.*
   b. *Precision machinists.*
   c. *Electronic instrumentation technicians.*
   d. *Chemical analysts.*
   e. *Radiation technicians.*
   f. *Data processing technicians.*

5. *Programs for the airlines.*

   a. *Pilot training.*
   b. *Aircraft maintenance personnel.*
   c. *Flight engineers.*
   d. *Aircraft communications maintenance.*
   e. *Stewardess school.*

6. *Adult education programs.*

   a. *Supervisory and management training.*
   b. *Training in special skills.*
   c. *Safety education.*

A review of the list of programs proposed in 1965 for TSTI reinforces the fact that it was created to address emerging and advanced technologies. Programs such as non-destructive testing technician, chemical analysts, quality control technician and instrumentation technician represented the "cutting edge" in the mid-60's.

Additional campuses, located at former air force base facilities, sprang up in Harlingen, (September 1967); Amarillo, (August 1970); and Sweetwater, (September 1970).

New programs were started overnight as federal and state funds were easily attracted to the new system. In 1969, TSTI was separated from Texas A&M and its own Board of Regents appointed.

TSTI experienced explosive growth both in enrollment and facilities during the late 1960's and early 70's. The early 80's saw the gradual slowing of enrollment growth for TSTI as other educational entities began to emerge and the availability of federal and state dollars dwindled. During the same period, community colleges expanded program offerings and, along with state colleges and universities, added branch campuses.

Still reeling from the rapid growth of the 60's and early 70's, TSTI, by the late 70's, began the process of playing catch-up with the construction of some new facilities, removal and modification of older military barracks and buildings, and the development and implementation of system-wide policies and procedures.

The years between 1975 and 1982 were a time of facility and management consolidation for TSTI. However, it was also a time when TSTI lost its dominant leadership role in vocational/technical education as other institutions (e.g., community colleges) increased their offerings of occupational programs and courses while TSTI turned from expansion to consolidation and a more inward orientation.

Increasingly, TSTI was thrust into a defensive posture politically and operationally as its student enrollment by 1984 began a slow but steady decline which subsequently led to reduced funding. However, the quality of programs at TSTI, as compared to other institutions, remained very high. Among those knowledgeable in technical education, the programs were considered the best available in the state or, for that matter, most anywhere else.

The problems associated with enrollment decline were compounded when TSTI was placed on the Coordinating Board contact-hour funding formula used by the community colleges. While the formula offered a predictable source of revenue and perceived funding stability, it was insidiously harmful to institutions with enrollments in a state of decline.

TSTI's circumstance was made worse because of deferred equipment and facility needs for high technology programs. When faculty, staff, and programs are cut due to reduced funding, it is extremely difficult to "retool" outdated programs with needed equipment or begin new initiatives if funds are not available and can not be secured through local tax initiatives or state-backed debt financing.

By 1988-89, TSTI had become entrapped in a declining enrollment pattern made worse by the loss of state funds (contact hour funding) for 1990 and 1991. This loss of funds caused TSTI to take decisive steps in the Spring and Summer of 1989 to bring operating costs in line with reduced state funding. Specifically, 143 faculty and staff were

reduced-in-force and 13 certificate and degree programs were closed at the Waco and Amarillo campuses.

In the fall of 1989 the enrollment decline stabilized. Programs such as Aircraft Maintenance, Laser-Electro Optics, Biomedical Equipment and Chemical technologies are showing sizeable increases. TSTI was born of economic necessity and operated in its early years from a position of opportunity. It is an excellent institution with an enviable history, dedicated faculty and staff, appreciative business and industry leaders, remarkable assets, and a very supportive alumni. The vision of those who created TSTI in 1965 is just as valid today as it was 25 years ago.

The vision of those who created TSTI in 1965 is just as valid today as it was 25 years ago.

Designing the Strategic Plan

Overview

In designing a strategic plan for TSTI, it was considered essential to work from a macro-perspective since institutionalized change takes time. The preceding section, which offered an historical perspective, is important to understand and appreciate so that changes made organizationally and programmatically will be substantive rather than just cosmetic.

A strategic plan designed for TSTI must be based on more than the self-serving motivation of institutional survival. An effective strategic plan must be based upon a clearly recognized and understood public need which is within the role, scope, and mission of TSTI.

TSTI maintains detailed facility plans for all its campuses which are updated annually, compiled into a consolidate system plan, and submitted to the Coordinating Board. The same is true for the campus budgets. The facility and budget plans are excellent control documents but, unless refocused, their primary effect will be to perpetuate prior programmatic and service functions of the institution.

For TSTI to achieve the intention of its legislative mandate and the vision of its founders, the development of a new needs-based and programmatically-oriented strategic plan was believed essential. Then, the facility and budget planning will be based upon the accomplishment of these identified goals and strategic objectives.

The Process

Since the strategic plan developed for TSTI was systems-based and designed around a shared vision and goals statement, it was necessary that as many persons as possible have input into the planning process. This was difficult because TSTI is an institution with four campuses and three extension centers located hundreds of miles apart and serving quite different constituencies. Time was also a major constraint since it was imperative that a strategic plan be implemented as soon as possible in order to prepare for the next legislative session and initiate steps which would increase enrollments and funding.

The planning process used in developing the strategic plan sought to mitigate the problems of distance and time by the use of existing system-wide committees and councils (e.g., Management Council—composed of campus presidents, vice chancellors, instructional deans) in the early development of a vision statement and the accompanying goals and objectives.

The Management Council, in particular, was used to identify institutional assets and liabilities as well as current local, state, and national issues or needs. Given the importance of the planning effort, the Chancellor chaired the process and actively participated in all meetings as well as made presentations and received input from various individual sources at the college, community, and state levels.

Once formulated, an outline of the strategic plan (vision statement, goals, and objectives) was discussed at the campus level with faculty and staff and their input obtained. The strategic plan was also presented to College Foundation members, the Board of Regents, different program Advisory Committees, business leaders from Houston and Dallas, and heads of public and private organizations and agencies. The Board of Regents for TSTI spent considerable time reviewing the planning documents and in July held a planning retreat specifically to review planning materials.

Fortunately, TSTI has an excellent management information system and research department which made the process of acquiring and analyzing data and information proceed rapidly. It permitted a much greater amount of time to be spent evaluating and analyzing state and national trends and forecasting their impact upon technical education and TSTI, in particular. In all discussions and reviews of the vision statement, goals, and objectives, those present were specifically asked to identify any "fatal flaw(s)" they might see in the proposed plan. It was believed that since there are probably several different plans which might work to varying degrees of success and one or two which would not work at all, it was imperative to first test for the flawed plan. Once fatal flaws were eliminated, then the decision was to choose the best plan.

The Board of Regents for TSTI held three meetings at which the Strategic Plan was discussed (May 7-8, Amarillo; July 16-17, Waco; September 17-18 and November 18-19, El Paso) and a strategic planning retreat July 15, in Waco. Each of these meetings was followed by a meeting of the Management Council which spent a day or more each time dis-

cussing the strategic plan. Following the Management Council Meetings, each president presented the information and ideas discussed to his faculty and staff for their comments.

Assessment of Resources

A comprehensive institutional assessment model was used at the systems level to make an initial status-check of the relative health of TSTI before beginning the planning process. The model used was the McKinsey 7-S model—Structure, Systems, Strategy, Shared Values, Skills, Staff, and Style—as modified with a listing of specific institutional characteristics for TSTI. Once the strategic plan is approved, it is expected that each campus will utilize this model to assess its capabilities of operationalizing the plan. (Appendix A)

Texas has a largely disarticulated system with each entity pursuing its own objectives, some of which reflect local entrepreneurial ambitions more than education objectives, and not necessarily what is best for the entire State of Texas.

The second step in the strategic planning process for TSTI was the identification of institutional assets and liabilities, target population groups for enrollment, and potential additional sources of revenue. Key local, state, and national issues which might impinge upon the campus and the system were also discussed. Three full-day planning sessions were devoted to this effort. In total, some forty-three specific liabilities were identified and thirty-nine assets. In addition, thirty-three target population groups were targeted for student enrollment and twenty-nine sources of potential additional revenue listed. Under issue identification, eleven state, five national, and five local items were mentioned.

The purpose of these assessment efforts was to cause an introspective look at each campus, the system, and the surrounding environment. This preparatory step in the planning process was designed to have the primary participants develop a workable shared understanding of essential factors likely to influence the success of a strategic plan. The process of participant interaction was also important in developing the management team for TSTI.

Assessing Other Plans

Since 1988, three documents important to technical education and TSTI have been published. Each was the result of an extensive planning process and addressed specific needs associated with technical education. The first document is entitled, *Greater Opportunities in Texas: A Master Plan for Vocational Education.* Near the conclusion of this document (page 46), a quotation entitled "The Year

2000—A Scenario" is presented which offers a vision of what could and should be.

> *"To meet the diverse needs of the adults in Texas in the year 2000, the post-secondary technical and vocational education delivery system will be a supra-facility that combines state-of-the-art, state-of-the-work place, and state-of-the-technology within business-based and campus-based laboratories. In conjunction with this laboratory there will be a teleport for transmitting and receiving interactive computer and telecommunications programs.*
>
> *High quality faculty will provide competency-based programs and courses for career adaptability, occupational training on a continuous basis to develop technological competencies, general education competencies, and 'skills to last a lifetime.'*
>
> *Access to the supra-facility will be available to individuals of different income levels, age, sex, and ethnicity, as well as those with diverse economically or educationally academic and cultural backgrounds to start wherever they are and to achieve success in their selected education and career goals. Additionally, access will be available to business and industry for updating and retooling."*

The second document is the *Report and Recommendations of the Governor's Task Force on Vocational Education* which was published in January, 1988. This document resulted from a study conducted by distinguished business and educational leaders who reported to the governor that, "Texas has a largely disarticulated system with each entity pursuing its own objectives, some of which reflect local entrepreneurial ambitions more than education objectives, and not necessarily what is best for the entire State of Texas." This committee in its report offered some additional observations which are instructive:

- "Quality of instructors, quality of course content, and quality of facilities are needed for successful vocational education."
- Minority enrollment in post-secondary vocational education must be increased.
- An integrated delivery system for vocational education in Texas is needed to achieve effectiveness at the lowest reasonable cost.
- The general image of vocational education should be improved with raised public expectations, better appreciation, and broader support.
- "Technical/vocational education has had a great deal of effort applied to it but is still far short of the modern system it needs to be."
- "Far too many people view vocational education as job instruction with no academic content for those not 'good enough' to pursue a college degree."
- Career cluster-specific orientation and concentration holds the greatest potential for development of some practical skill/knowledge while providing increased options for actual student career choices.
- Support should be given the Vocational Master Plan and its implementation with emphasis on quality, equity, and accountability.

The third document is entitled *A Strategic Economic Plan for Texas* and was published by The Strategic Economic Policy Commission in January, 1989. This study in its list of four major strategies for economic development in Texas identified as Strategy II "Provide a well skilled, flexible, internationally competitive work force." Among the objectives under that strategy, the following were listed:

- "Improve and expand educational services that ensure fundamental mental basic skills—including literacy—for all Texans."
- Development of a responsive, integrated system for technical and vocational training and retraining.
- Improve the quality and responsiveness of higher education to meet the needs of a changing Texas economy."

While other documents could be cited in support of technical education and the role and mission of TSTI, the preceding overwhelmingly present for Texas the necessity for renewed interest and investment in technical education.

Competing in the World Economy

Overview

The rise of many foreign economies, notably those of Japan and Western Europe, has resulted in a "World Economy" in which the United States is only one of the major players. We have become increasingly aware of the importance of exporting our goods and services due to the continuing trade deficit which the United States has experienced in the last decade. This trend is reason for concern for the long term; it does tend to overshadow the fact that the U.S. is still the world's largest exporter with 18% of the total export market. West Germany is second with 13% and Japan is third with 12% (*America in the Global '90's*, Kiplinger). While still in a position of strength, the U.S. position in the world economy has declined steadily since the late 1960's.

...when you consider that only two in ten Texas firms with the capacity to export presently do so, the capacity of the state to increase its exportation of goods and improve its relative economic status is enormous.

Since the end of World War II, other nations have reconstructed their industries. They took lessons from the United States on the system of universal education, adapted and improved it. As their income levels started to catch up with those in the United States, the size of the American market declined relatively. Managerial talent and experience is no longer better in the U.S. than it is in Germany or Japan and the general "quality of the work force" in the U. S. has significantly deteriorated when compared to European and select Pacific Rim competitors.

Importance of Exports to Texas

According to *Texas Perspectives*, October 1989, the state increased its exports from $19.9 billion in 1987 to $27.4 billion in 1988. The bulk of the products exported were manufactured items (e.g. machinery, electronics, computers) and commodities such as agricultural products. *Texas Perspectives* points out that "... manufacturing has led the recovery of the Texas economy ... Growth in (nationwide) foreign trade has been one of the prime reasons for overall manufacturing improvement..."

While the positive increase in exports was largely influenced by the decline in value of the dollar, this stimulation of the entire domestic industrial complex was fortunate for Texas. According to *Texas*

Perspectives, "what is good for the nation's manufacturers is good for Texas, as relatively few finished goods are produced in this state."

Furthermore, when you consider that only two in ten Texas firms with the capacity to export presently do so, the capacity of the state to increase its exportation of goods and improve its relative economic status is enormous. Add to this potential production capacity the fact that one out of every eight Texas manufacturing workers is employed in an export-related field and the impact of exports on Texas and Texans becomes critical to the "quality of life."

To be competitive in the "world economy," U. S. manufacturers must concentrate their efforts on the production of goods and services which are not commonly produced in the developing or low-wage nations of the world. The desired products tend to be more complex, use high technology either in design or manufacture, and typically are "knowledge intensive" in operation.

Some examples of these high tech products are found in aerospace technologies, super computers, information storage and handling, telecommunications, composite materials, biotechnology, etc.

In the book *Made in America*, members of the MIT commission reminded the reader that West Germany, during the reconstruction of its economy, adopted the slogan of "Export or die!" While the United States and Texas are not in those dire straits, we must "export or see (our) relative standard of living diminish."

Demographic Factors

Recent publications such as *Work Force 2000* and *Opportunity 2000*, both published by the Department of Labor, have identified some significant trends which are influencing and will influence the American workplace and worker. Among the more obvious findings is that (1) the average age of workers will rise, (2) more women will hold jobs, (3) there will be fewer secondary school graduates, (4) more immigrants will enter the work force, (5) one-third of the new workers will be minorities and (6) the new jobs will require higher skill levels.

Some of the characteristics used to describe the U. S. work force can be used to describe the work force in Texas. However, there are important differences. From 1959 to 1970, the Texas population grew steadily, adding 1.6 million in the 50's and 1.8 million in the 60's. During the 1970's, Texas population growth exploded by more than 3 million persons, more than twice the national average.

By the year 2000 there will be nearly 21 million Texans, making Texas the second largest state in the nation. During the next decade, indigenous population growth will be the primary source of population growth for Texas—not immigration. Also, the racial mix for Texas will change as Hispanics become a larger part of the population. This growth results from an increased birthrate for Hispanics compared to a declining rate for Anglos and a slightly declining rate for Blacks.

In 1986, 39% of the state's population was made up of Hispanics, Blacks and other minorities. By 2025, they are expected to make up over 50% of the state's population. Considering the educational attainments of different racial groups, these population changes will directly impact the work force and the economic recovery of Texas.

For example, among the general population, one-third of all students who enter high school fail to graduate. The dropout rate for Hispanics is 45 percent, 34 percent for Blacks and 27 percent for Anglos. This problem is compounded by the fact that Texas currently ranks 47th in literacy among the states.

As pointed out in *A Strategic Economic Plan for Texas*, the implications of these factors and others (e.g., an aging population) on the state's economy could be devastating—a less educated and trained work force and a greater demand for public services.

The preceding trends in dropout rates and literacy will have to be improved if Texas is to remain competitive in the future. Presently, these trends have grown worse for dropouts with only marginal improvement cited for literacy.

Applied Technology and the Commercialization of Research

As mentioned in *A Strategic Economic Plan for Texas*, economic development for the state has been largely dependent upon the development and application of new ideas to spur new growth. First, there was the railroad and the transportation of goods, then drilling technology and increased oil production, and, more recently, the development and application of the microchip.

As evidenced by the events of the past decade, technological advantages, once gained, are difficult

to sustain. The Japanese and Europeans are making major inroads into the technological and scientific dominance held by the United States. In fact, there is much evidence that, for the first time since the mass manufacturing of the Model T, the United States is trailing another nation—Japan—in technology. Where Sputnik represented a symbolic challenge to the country in the 1950's, technology represents a real economic challenge today.

"Chips, electronics and biomedicine are the fuel of economics worldwide heading into the 1990's," ("Texas Lagging as Race for High-Tech Heats Up," *Dallas Morning News*, 12-11-89).

"America is by no means lacking in technology. But it does lack the creativity to apply new technologies commercially," (by Akio Morita, co-founder of Sony in "A Japanese View: Why America Has Fallen Behind", *Fortune*, September 25, 1989). This statement points out the need for the U.S. and Texas to capitalize on our historical ability to put new ideas to practical use.

The next step must be to invest in those institutions which can best help commercialize the informational products of our research laboratories through the training and retraining of technicians in advanced and emerging fields.

In a report to the Science and Technology Committee of the Texas House of Representative in November, 1986, it was suggested that Texas provide a "more and wiser investment in research and development (R&D), coupled with technology transfer and accelerated commercialization of new products and processes...as a way for Texas to both develop a more diversified economy, and become a leader instead of a follower, in the technology-oriented economies of the future." More specifically, they argued that a strong research base would help buffer the state against economic changes and could be aimed at keeping a diversified group of Texas industries on a competitive edge.

Texas, by investing in the scientific research and development capabilities of its major universities, has taken an important first step in maintaining and developing the technological capacities to produce ideas and information.

The next step must be to invest in those institutions which can best help commercialize the informational products of our research laboratories through the training and retraining of technicians in advanced and emerging fields (e.g., materials technology).

The Changed Workplace

What does the new workplace look like? Visibly evident in most firms is the increased use of computer-controlled devices to replace repetitive, routine operations.

The new workplace job skills and attributes are substantially different from the strength and motor skills (e.g., agility, dexterity) that are being eliminated. The increased use of computers and telecommunications has clearly brought to the attention of industry and business leaders, as well as educators, that the day of the singularly trained specialist is limited. Systems (e.g., electrical, mechanical) of all types now abound in today's society. Their operation and repair requires a worker to have a broad-based knowledge as well as a higher order of learning skills which go beyond simple recollection and recognition.

In contrast with American industry prior to the 1970's, manfucturing employees can no longer be unskilled or semi-skilled...they must be technicians. "What manufacturing is increasingly about is working with computers and other high-tech equipment. Grease monkeys need not apply." (*Newsweek*, July 18, 1988)

People who utilize principles from the mathematical or natural sciences in their work are "technicians." This definition encompasses a wide range of occupations from laboratory assistants to manufacturing engineering assistants. What differentiates the work of a technician from yesteryear's production worker is the use of knowledge vs. use of hand power, increased worker responsibility and decision-making, participation in work planning and management teams, and more flexibility to meet changing work and product requirements. Technicians are also more likely to be leaders in the workplace.

The following are some examples of the emerging and changing technical occupations which meet the definition of a "technician" (from "A Pilot Identification of Emerging Occupations in Texas", September, 1989). This list is by no means complete.

- Telecommunications Specialist
- Network Systems Specialist
- Environmental Laboratory Technician
- Waste Recycling Specialist
- Manufacturing (Engineering) Technician
- Robotics/Automated Systems Technician
- Artificial Intelligence Technician
- Biotechnology Research Technician
- Biotechnology Production/Quality Control Technician
- Laser/Electro Optics Technician

"The continuous integration of new technologies with more highly skilled labor is the true engine of American competitiveness. We cannot rely on strong backs and raw resources," (*Training and Development Journal*, November, 1988).

The Challenge to Technical Education in Texas

> "Take away my people but leave my factories and soon grass will grow on the factory floors. Take away my factories but leave my people and soon we will have a new and better factory." (Andrew Carnegie)

People are the most important but often least nurtured asset in the United States and Texas. To take full advantage of the new technologies and applications of these technologies, the country and the state needs a technically trained work force.

According to Jerry R. Junkins, chairman of Texas Instruments Inc., "Texas...fails to produce enough technical graduates at the college level to supply even the existing needs of Texas technology companies. We don't have the infrastructure to keep up." (*Dallas Morning News*, December 11, 1989).

The Texas State Occupational Information Coordinating Committee (SOICC) in its *Emerging Occupations Study*, concluded that "Texas can ill-afford to be hampered by a lack of solid knowledge about changing skills and occupations - especially since research on high technology start-ups and location decisions clearly shows that access to workers with the right skills at affordable wages is the number one factor on which business and industry base these decisions."

Since the end of World War II, the economies of most nations of the world have advanced significantly. While the U.S. economy has experienced both extended periods of growth and a few recessions, we now find ourselves at a point where our future economic dominance is not assured. The imbalance of trade imports over exports is threatening our financial independence. Our current position is the result of not having kept pace technologically in many segments of the economy, espe-

cially in manufacturing. The major problem in this regard is not the availability of high-tech equipment, but the relatively poor application of the new technologies in the development and production of new products and services. Underlying this situation is the lack of investment in training and retraining the technical work force to be competent in the new technologies. As has been noted, Texas does not currently graduate enough college-educated technicians to meet the state's present demand.

The key to our future economic survival will depend on our ability to produce goods and services which will be competitive in the world's marketplace. Since we cannot compete effectively in low-skill industries against the low wages paid to workers in developing nations, we have no alternative but to compete at the high-technology end of the market where the "value added" to the product and services will justify our relatively high wages and support our standard of living.

What is lacking now is the link between the pure research and the commercialization of new products. A major roadblock to the commercialization process is the shortage of trained technicians.

Great strides have been made in diversifying the Texas economy since the early 1980's and the legislature is to be congratulated for providing funding for the research programs of our public universities. This is a step in the right direction. What is lacking now is the link between the pure research and the commercialization of new products. A major roadblock to the commercialization process is the shortage of trained technicians.

Texas can significantly improve its economic results by initiating a sustained effort to increase exports by (1) increasing the number of firms which export from the current level of two of ten which have the potential to export; (2) producing more finished goods within the state instead of exporting the raw materials for processing or manufacturing elsewhere; and (3) increasing the use of advanced technologies to improve competitiveness.

The next section presents a more detailed look at four specific needs Texas has in trying to improve its economy.

A Problem for Texas: An Opportunity For TSTI

Texas now finds itself in the midst of rebuilding and reshaping its economy. Economically devastated in the mid-80s with the collapse of the oil and gas market and related areas of banking and real estate, Texas is aggressively seeking the diversification of its economy as a means of better balancing the state's economic profile.

However, diversification will not happen overnight since several critical issues must be addressed. TSTI can address four key issues essential to the economic recovery and continued economic health of Texas.

First is the issue of a "quality work force" for Texas. Mid-and small-sized businesses which are the great job creation engines of the future need a flexible work force able to adapt and thrive on an ever-changing work floor. They need employees who can assume responsibility as decision makers and "fit in" with the new workplace culture.

On the bright side, Texas, with its youthful population, positive birthrate among Hispanics, and an immigration of workers, has an abundant supply of labor well into the 21st century. Access to a growing labor pool of workers will be a vitally important asset in the coming years.

On the negative side, Texas' growing pool of labor is relatively unskilled due to an increasing number of high school dropouts and one in three Texas adults being functionally illiterate.

Another dimension of the literacy problem is that of workplace literacy. Literacy in the workplace means that employees, besides being able to read, write, and compute, need a day-to-day working knowledge of the appropriate sciences (e.g., chemistry, physics, biology) and math used by the business and industry, as well as an ability to communicate orally and in writing (e.g., letter, meeting, telecommunications) using those terms, conditions, syntax, etc. normally used while conducting business.

Texas has the natural resources—people—but it must refine those resources if they are to be productive and provide business and industry with a competitive advantage other than low-cost labor.

Tomorrow's worker will increasingly use cognitive (mind) skills and interpersonal (social) skills more than psychomotor (hand) skills. A worker will be required to interact socially and intellectually on the work floor, in addition to being a contributing team member and independent decision maker in his/her area of responsibility.

A second critical issue for Texas is rural economic development. The decline of the oil industry and related businesses left much of West Texas and other areas of the state in economic disarray with the smaller towns suffering the most.

Lacking the infrastructure (e.g., transportation, manpower, education, capital) needed for the attraction of export-based industries (e.g. manufacturing, distribution), these communities struggle to remain economically viable.

Without economic growth through business and industry expansion or attraction, smaller communities suffer a continuing erosion of their tax bases and a subsequent deterioration of their infrastructure (e.g., schools, roads, health-care) making recovery even more difficult.

Texas cannot abandon the economic needs of its smaller communities while seeking recovery for its more populated urban areas which offer more of the essentials (e.g., manpower, transportation, capital) needed for economic development.

New efforts and initiatives need to be tried in helping the smaller communities cope with their economic problems. For example, given the new technologies, it is now possible for design engineers to be located thousands of miles from their manufacturing sites.

It is possible to transmit engineering designs and drawings "real time" to the manufacturing floor for production through the use of telecommunications and mainframe computers at one site linked to microcomputers located at a different manufacturing site. This may make it possible for manufacturing operations to be effectively located in small towns.

Other initiatives are possible in agriculture and agribusiness areas where the application of new technology and new marketing techniques may work.

A third issue is the commercialization of recent

scientific research findings and breakthroughs. To compete internationally requires production of a "world class" product necessitating continuous work floor and worker improvements.

New production models and prototypes are needed in numerous manufacturing areas (e.g., electronic components, medical devices, petrochemical industries) such as those being tested by SEMATECH for the semiconductor industry. Besides training students and employees in the latest techniques and applications of technology, prototypical production cells are needed to assist industry in solving selected production problems.

In most organizations, the greatest amount of time, energy, and funding is spent on the abstract and cognitive-intensive efforts of scientific research and new product design while minimal attention is given to manufacturing. This oversight has been a major flaw in America's efforts to compete on a world class level with the Japanese.

A too frequent misconception is that the impediments to a world-class manufacturing operation are primarily technical. While no one may have a fully complete CIM or world-class manufacturing system, it is possible to get 80 to 90 percent of the way with the technology available today. However, most companies have achieved less than 25 percent of the CIM possibilities. There is plenty of technology left for them to use.

The primary impediment to "world-class" manufacturing in Texas and elsewhere is people--their lack of knowledge, their resistance to change, or simply their lack of ability to quickly absorb the vast multitude of new technologies, philosophies, ideas, and practices that have been introduced in manufacturing over the last five to ten years. Only training and education can solve this problem.

A fourth issue is the development of a responsive, integrated system for technical education, training, and retraining. This is a critical problem for Texas. Despite the fact that Texas has a number of agencies responsible (e.g., public schools, community colleges, health science centers, proprietary schools, TSTI) for technical education and training, there is an inability to respond in a timely manner to business and industry training and education needs.

Competing states such as Oklahoma, South Carolina, and Indiana have tightly integrated technical education and training delivery systems capable of rapid response to training and retraining requests.

These same states and others have developed "showcase" technical centers featuring the latest equipment and processes in applied technologies. In most cases, the applied technology centers are used as infrastructure commitments by states and cities as part of their incentive package to attract new industry and help support existing operations.

TSTI affords Texas the essential infrastructure to develop a "world class" technical education and training system with the capacity to showcase advanced technologies.

Positioned to Help

TSTI is best positioned among all the higher education institutions in Texas to address the four key issues associated with economic development mentioned in the preceding section.

As a technical college system, TSTI is legislatively mandated to address the "industrial and technological manpower needs of the state" [70th Texas Legislature, Regular Session, 1987]. There are several key assets associated with TSTI which make its role in Texas' economic recovery even more important.

Unique Assets

- The Texas State Technical Institute is the only state-supported technical college system in Texas. Created by the Texas Legislature in 1965, TSTI is authorized to develop highly specialized technical programs giving primary consideration to the industrial and technological manpower needs of the State. It is governed by an independent Board of Regents directly appointed by the Governor.

- TSTI is the state's only residential technical college system and is the largest institution of its kind in the country, providing housing for 2,275 single students and 1,027 married students.

- TSTI has a "statewide mission" for training and educating technical students especially in those areas requiring highly specialized technical and vocational degrees and certificates. Presently, TSTI has students enrolled from 245 of the 254 counties in Texas and over 99% of the students enrolled are from Texas.

- TSTI has an important "critical mass" of knowledgeable and experienced technicians and engineers, equipment and facilities, and programs and courses necessary to develop, operate, and teach "world class" production concepts and practices in several fields such as manufacturing, aerospace, graphics, etc.

- TSTI has operated, since inception, from a business/industrial perspective which stresses workplace attitudes and values associated with a production environment

TSTI has an important "critical mass" of knowledgeable and experienced technicians and engineers, equipment and facilities, and programs and courses necessary to develop, operate, and teach "world-class" production concepts and practices...

resulting in a strong work ethic for TSTI graduates.

- TSTI maintains a close liaison with business and industry leaders. A total of over 1600 industry advisory committee members meet with TSTI faculty and staff to provide guidance and insight regarding industry work force needs, changing technology, and curricula development needs. Based on these inputs, program curricula are adjusted to maintain consistency with industry requirements.

- TSTI has campuses and centers located in both rural and urban areas including the Valley and the Panhandle, providing students in different parts of our state access to quality technical education.

- TSTI graduates approximately 3,000 students each year, which, when compared to the Fall enrollment, is approximately 34%, giving TSTI the highest graduation percentage of any higher education institution in Texas. As a comparison, The University of Texas had a comparable percentage of 20%, Texas A&M 19% and the community colleges' graduation rate was less than 7% in most cases.

- TSTI, with 802,609 square feet reserved for laboratory space, has the essential infrastructure necessary to develop an applied work floor-oriented research and development program oriented toward competitiveness.

- The Laser Electro-Optics laboratories on the TSTI-Amarillo and TSTI-Waco campuses contain 60 lasers valued at over $40 million. This equipment is frequently utilized by industry on a contract basis. The Laser Electro-Optics programs are recognized nationwide for the quality and versatility of their education and training. Graduates of these programs work on the nation's Star Wars system and the laser faculty are called upon to teach courses on the elements and operations of laser systems at the Los Alamos National Laboratories and to aerospace and defense companies.

- A fully equipped Flexible Computer Integrated Manufacturing center has been established at the TSTI-Sweetwater campus. This center can take a machine part from design concept through machining, inspection, assembling, packaging and final storage. This state-of-the-art system is helping to provide the technical manufacturing support needed by Texas business and industry.

- TSTI-Waco, in cooperation with SEMATECH and the Center for Occupational Research and Development, has a funded project for $417,000 to develop and implement a semiconductor manufacturing technician curriculum which will be the first of its kind.

- The TSTI Development Foundation, established in 1979, consists of 75 business and industry leaders who share their time and talents to help TSTI in its mission to provide quality technical education. Foundation members assist with the acquisition of needed equipment and provide leadership which directly impacts TSTI's programs. Member industires include:

Dow Chemical, U.S.A. * AVIALL * KBLCOM * The Methodist Hospital Health Care System * Spectrum Consulting Group, Inc. * Rockwell International * AAA Real Estate & Investments * North Houston Pole Line Corp. * Affiliated Foods, Inc. * Bell Helicopter Textron, Inc. * City of Harlingen * ASARCO, Inc. * Griffin and Brand of McAllen, Inc. * Allergan, Inc. * Right Away Foods * H. B. Zachry Co. * M&M MARS * The M. W. Kellogg Co. * J. C. Penney * Ralph Wilson Plastics Co. * General Telephone * DuPuy Oxygen & Supply * ALCOA * The Campbell Soup Co., Inc. * Central Freight Lines, Inc. * Amoco Chemical * KXXV-TV * Southwestern Bell Telephone * Brown & Root, Inc. * Hino Gas, Inc. * Peoples Bank * Texas Hospital Education and Research Foundation * Houston Lighting & Power * Associated General Contractors of Texas * Marathon-LeTourneau Corp. * Texas National Bank of Waco * Club Corporation of America * American Wellhead Services * Darr Equipment Co. * Scott & White Memorial Hospital * TRW Vehicle Safety Systems * Inter-Industry Conference on Auto Collision Repair * Claydesta ATC * L.L. Sams and Sons * BASF Corporation * National Medical Care * Mason & Hanger-Silas Mason Co., Inc. * Amarillo Gear * Hygeia Dairy * Phillips Petroleum * Rountree Olds/Cadillac * KTAB-TV * Milton Schiller Enterprises * Descon Construction, Inc. * Xerox * J.H. Strain & Sons, Inc. * Texas Instruments * Temple-Inland Forest Products Corp. * Churchill Group, Inc. * Central Power & Light * Texas Utilities Electric * AT&T * Wehman, Inc. * Mission Consolidated ISD * Motorola, Inc. * Young Brothers, Inc. * TYMCO, Inc.

- The largest campus in the TSTI network, TSTI-Waco, is something of a city unto itself. With 5,000 residents in 866 houses, 142 campus buildings containing 1,356,000 square feet of interior space, and 16 commercial buildings of 558,000 square feet, the TSTI flagship campus is a city of technology.

- TSTI-Waco has its own airport. In fact, using its four million square feet of concrete aprons and runways, one of which is 8,600 feet long, the airport at TSTI-Waco can accommodate any aircraft currently flying. This extensive runway system, the FAA Tower which operates 18 hours a day, and the precision instrument landing system which aids arriving and departing aircraft during inclement weather have not gone unnoticed by the aerospace industry. A number of fast-growing aerospace companies, employing over 1,500 people, are making use of the TSTI-Waco facilities and strategic aviation location to make this airport an important economic center in aerospace technology.

- With special grants received from the Texas Higher Education Coordinating Board, TSTI is currently involved in the development of new exemplary programs in the area of Composite Materials Technology and Hazardous Materials Management Technology.

- In addition to Certificate and Associate Degree program offerings, TSTI develops and delivers custom training for 20,000 Texas employees each year for a total of 770,000 industrial contact training hours.

- Over 600 faculty members, all highly qualified in their areas of specialization, are the driving force of TSTI's educational delivery system. Most of the faculty members have been recruited from industry and their previous experiences result in a teaching emphasis on competencies, skills and work-ethic as well as academic excellence.

The preceding list of assets is far from complete but does point out the capability and capacity of TSTI to assist in the economic recovery of Texas.

In order to leverage these assets to the best advantage for the Texas economy, TSTI must be recognized, understood and appreciated for its role and mission in higher education.

A number of fast-growing aerospace companies are making use of the TSTI-Waco facilities and strategic aviation location to make this airport an important economic center in aerospace technology.

The Students

TSTI students are given sound foundations in both academics and technology. Their college work instills in them a creative, enthusiastic work spirt that enables them to adapt to change, meet deadlines, make decisions and be part of a team. They acquire a strong work ethic and the values and attitudes that are sought by business and industry.

The 8,303 students attending TSTI are unique. Eighty-one percent are full-time compared to the national average of 32 percent for full-time public college students. (Appendix B, Additional Information)

99% of TSTI's students are Texans.

81% are full-time.

51% come from cities of less than 25,000.

TSTI Demographics

Race	White	59.0%
	Black	5.3%
	Hispanic	34.7%
	Other	1.0%
Age	15-17	1.2%
	18-24	62.3%
	25-30	16.2%
	31-40	13.7%
	40+	6.7%
Sex	Male	73.5%
	Female	26.5%

Fall 1989 Headcount by Program Cluster

Aerospace	440	5%
Agribusiness	210	3%
Automotive/ Transportation	1,022	13%
Construction	589	7%
Electronics	2,004	25%
Health/BioTech.	546	7%
Industrial	558	7%
Computer/ Information	1,660	20%
Information Processing/Office	866	11%

Select Initiatives

The fulfillment of TSTI's mission results in a significant direct impact on the Texas economy through the job placement of highly skilled technician-graduates, the delivery of custom designed industry training programs, industry related research and technical assistance to industry. The following describe specific points of economic/high technology impact:

- IBM and TSTI-Harlingen have entered into a joint agreement to establish a trial program to teach remedial/developmental courses and workplace literacy.

- TSTI-Harlingen and the University of Texas-Pan American have entered into a cooperative agreement to provide business assistance to Valley companies. The Center for Entrepreneurship and Economic Development will be housed on the Harlingen campus and TSTI will provide training and retraining for company employees in technical areas.

- TSTI-Sweetwater is working with the Texas Department of Agriculture to identify training needs for employees who will work in new food and fiber production technologies. Targeted areas are computerized irrigation and fertigation systems.

- TSTI's customized training clients include ALCOA, Rockdale Works, General Dynamics, M&M/Mars, Chapparal Steel, Texas Highway Department, Johnson & Johnson and many others.

- Students at TSTI-Amarillo are being taught artificial intelligence languages such as LISP and Ops Five. These students are learning to program systems which have artificial intelligence--the ability to make decisions based on empirical experience. The majority of these uniquely trained students work for Texas Instruments in the Dallas-Fort Worth Metroplex after graduation.

- TSTI-Waco has the only certified Mining Safety and Health Association training center in the state. Annually, many of the 14,000 mine workers receive safety training from TSTI.

- The Nuclear Technology program at TSTI-Waco is one of five such programs nation-

The fulfillment of TSTI's mission results in a significant direct impact on the Texas economy through the job placement of highly skilled technician-graduates, through the delivery of custom designed industry training programs, industry related research and technical assistance to industry.

wide and one of only two such programs west of the Mississippi River.

- Over 55 programs of study are offered by TSTI campuses in highly technical and vocational areas. These programs are typically more intense than at other institutions of higher education. Students in TSTI degree programs spend 27 to 30 hours per week in classes and laboratory sessions. The average full time two-year and four-year college student is involved in the same activities 15 to 20 hours per week. (Appendix C, Program List)

- TSTI offers programs in the following program cluster areas:

  Aerospace Technologies
  Agribusiness
  Automotive/Transportation Technologies
  Applied Service and Construction
  Applied Academics
  Electrical and Electronic Technologies
  Environmental and Energy Technologies
  Health/Bio Technologies
  Information & Presentation Technology

TSTI has awarded 42,756 degrees and certificates since it was created on April 22, 1965.

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- The Motor Vehicle Manufacturers Association and the American Vocational Association named TSTI-Waco's Automotive Technology program #1 in the nation last year for the quality of education and training its students receive.

- The Surgical Technician program at TSTI-Harlingen has a 100% placement record for its students who are in great demand to fill the gap left by the shortage of nurses.

- The Waco campus offers FAA approved Aircraft Pilot Training. Students become private and commercial pilots and develop the skills to obtain an instrument rating. The campus has a simulated flight laboratory and 17 aircraft on which student pilots train. These students consistently place as top competitors in national competition with 130 other two-and four-year colleges.

The Vision: Being "World-Class"

In this section, emphasis is placed on how TSTI can best help Texas strengthen its economy. This will be done by (a) reviewing the legislative mandate for TSTI, (b) identifying the precepts that give definition and shape to the conduct of TSTI, (c) examining TSTI's vision relative to its mandate, (d) listing the goals that have been selected in order to fulfull the vision statement, and (e) reviewing the strategic objectives required for each of the listed goals. Concluding this section is a review of strategic outcomes.

Legislative Mandate

TSTI was created by the Legislature as a unique or special purpose institution for providing business and industry a quality work force in the advanced and emerging technologies. The legislative mandate has remained fundamentally unchanged except to limit the offering of duplicative programs found in community colleges.

"The Texas State Technical Institute shall serve the State of Texas by offering occupationally oriented programs in highly specialized technical and vocational areas for certification or associate degrees. Each Texas State Technical Institute campus is authorized to develop and offer highly specialized technical programs with related supportive course work. Primary consideration shall be placed on industrial and technological manpower needs of the state. The emphasis of each Texas State Technical Institute campus shall be on programs that do not duplicate programs commonly offered by public junior colleges and on excellence in instruction and public service. However, upon a finding by the Coordinating Board of the need for a program not available locally from a public junior college, the Coordinating Board may authorize an existing campus of the Institute to offer the needed technical or vocational program. Faculty research, using the facilities provided for and consistent with the primary function of the institution, is encouraged. Funding for research should be from private sources, competitively acquired sources, and appropriated public funding."

Section 135:01 Texas Education Code

TSTI was created by the Legislature as a unique or special purpose institution for providing business and industry a quality work force in the advanced and emerging technologies.

Precepts

Based upon prior history and the legislative mandate, the following precepts have evolved. These precepts reflect the values and culture of TSTI.

They also provide the foundation for and give direction to the vision, goal and strategic objective statements.

TSTI will stress excellence in "all" programs, certificate and associate degree, as well as in short term training for industry.

TSTI will remain a unique or special purpose institution among the higher education community in Texas as a technical college.

TSTI will retain its instructionally-intensive format which stresses laboratory experience.

TSTI will stress primary service to full-time students but offer opportunities for part-time students.

TSTI will remain a residential-based institution providing technical education to students from all areas of Texas.

TSTI will stress one-and two-year technical and vocational programs unique in nature or highly specialized technically.

TSTI will remain an organized system of technical colleges and centers.

TSTI will stress programmatic, facility, resource, and personnel development of the primary campuses—Waco, Sweetwater, Amarillo, and Harlingen—to assure a strategic massing of resources sufficient to assure excellence in technical education.

TSTI will directly and actively support economic development efforts at the state, regional, and local levels through education, public service, and appropriate research.

TSTI will stress the teaching and learning of those attitudes and values associated with a productive work culture.

TSTI will seek the active involvement and input from business and industry to assure curricula relevancy and the need for new programs and courses.

TSTI will stress excellence in "all" programs, certificate and associate degree as well as in short term training for industry.

Institutional Vision Statement

The mission statement for TSTI is stated in the form of a vision, for it reflects more than TSTI's purpose. It is the image of TSTI's full potential; an image that is dynamic and requires constant growth on the part of all persons who may become a part of this vision.

> *TSTI will be a "world-class" collegiate leader in technical education offering Texas and all Texans unique learning opportunities designed to maximize student acquisition of knowledge, values, attitudes, and skills needed for the development of a "quality work force."*

TSTI will be a "world-class" collegiate leader in technical education offering Texas and all Texans unique learning opportunities designed to maximize student acquisition of knowledge, values, attitudes, and skills needed for the development of a "quality work force."

Goals

For TSTI to best assist in the economic development of Texas, the following goals have been selected. These goals provide the focus and direction for the strategic objectives which in turn specify what is to be done for the goals to be achieved and for the vision to become a reality.

I. Quality:	Exemplary Technical Programs, Services, and Instruction.
II. Opportunity:	Statewide Student Access to TSTI Programs and Services.
III. Cooperation:	An Articulated Technical Education and Training System for Texas.
IV. Commitment:	An Education Delivery System of Programs and Services Supportive of Texas Economic Development.
V. Management:	An Organizational Structure and Culture Supportive of Responsive and Responsible Decision Making.
VI. Investment:	Resource Attainment and Image Development for "World-Class" Status.

Combined and considered as an economic development package for Texas, the goals for TSTI of Quality, Opportunity, Cooperation, Commitment, Management and Investment add up to a significant competitive advantage in the global marketplace.

Goals/Strategic Objectives

In order for the U.S. and Texas to compete in the global marketplace, our country and state must produce "world-class" products which are of high quality, low cost, customized, and first-to-the-market. To achieve this goal, a quality work force is necessary. A system of four technical colleges and three centers, Texas State Technical Institute represents a unique public asset which has the capabilities to provide state, national, and international leadership in providing technical education for a quality work force, affording Texas business and industry a significant competitive advantage.

The following presentation of goals with related strategic objectives, pertain to the overall TSTI system. Some strategic objectives will be accomplished by all campuses, other strategic objectives may be concentrated within a single campus. Also, each campus will be developing specific strategic objectives of its own.

Goal I.
Quality: Exemplary Technical Programs, Services and Instruction

Great strides have been made in the use of technology in the workplace and in educational settings. A "world-class" technical education will provide students with real-world learning opportunities in prototype workplace/laboratory settings. Student learning will be facilitated by technology-enhanced education (e.g., self-paced/computer-managed instruction) based on pedagogically proven teaching practices (e.g., frequency of reinforcement, repetition). Instructional programs and courses will offer an increased integration of technical principles and technology application permitting greater knowledge and skill transfer. New workplace and work floor values and attitudes requiring increased employee teamwork and participation in decision making will be reinforced through laboratory, classroom, and extracurricular learning experiences. State, national, and international standards of excellence for programs and graduates will be sought. **As a special purpose (technical college) institution, TSTI has the potential—with its "critical massing" of facilities, personnel, programs and equipment—to provide Texas and Texans with the highest "quality" technical education and training.**

A. <u>Prototype Instructional Laboratories And Studios</u> featuring computer- and telecommunications-based hardware and software configurations (e.g., distributed networks) which are supportive of export-based industries and businesses will be provided including:

- **Computer integrated manufacturing cells** featuring different production scenarios such as found in the semiconductor industry, electronic component manufacturing, petrochemical industry, etc. where work floor commonalities exist in terms of general manufacturing concepts and precepts (e.g., JIT, SPC, TQC, TCT) for the purpose of providing students with a total perspective of the larger work floor and the relatedness/interdependence of each sector or segment.

- **Electronic integration** of graphics technology programs (e.g., commercial art, printing) using a micro and mainframe-based computer networking environment which features a digitally-oriented exchange of data for the purpose of providing students a unique laboratory experience where art as information can be better understood and applied.

- **Aerospace Technology** courses and programs which stress materials technology (e.g., composites) advanced avionics and nondestructive testing/inspection techniques as essential value-added dimensions for the traditional aircraft maintenance programs.

- **Office/service sector systems integration** which focuses on computer hardware, software and LAN networks as an integral part of operations as well as work floor culture changes resulting from the application of new technologies (e.g., optical scanning, optical storage, data presentation, telecommunications networks.)

- **Development and application of Materials Technology** for export-based manufacturing industries featuring the disposal of hazardous materials, handling of exotic and fragile materials, ceramics and superconductivity.

- **Other prototype laboratories** to be established include such areas as telecommunications, biotechnology and agribusiness, food services, transportation and applied academics.

B. **Emerging and Advanced Technical Programs**, courses, and modules supportive of Texas industry and business needs will be developed and existing curricula will be updated to support emerging technical occupations:

- **The Texas Department of Commerce** study entitled "A Pilot Identification of Emerging Occupations in Texas" completed September 1989 identified 22 occupations as emerging due to technological changes in Texas industries. Some of the occupations particularly appropriate to TSTI include:

  Telecommunications Specialist
  Computer Network Technician
  Information Technology Support Specialist
  Database Specialist
  Artificial Intelligence Technician
  Biotechnology Technician
  Robotics/Automated Systems Technician
  Computer Integrated Manufacturing Technician
  Office Systems Specialist
  Artificial Vision Technician
  Bio-Medical Equipment Technician
  Industrial Process Technician
  Environmental Laboratory Technician

- **Work floor culture education and training** modules developed and offered for concepts and techniques such as Total Cycle Time and Statistical Process Control, Team Building, Yield Production, and Leadership support increased competitiveness.

- **Applied academics** (e.g., physics, chemistry, math) taught by technology enhanced learning opportunities (e.g., video-based/computer-integrated learning, self-paced learning modules, simulation exercises) which support instructional content and formats oriented toward the "hands-on," visual, and inductive learning predispositions of technical students and technical employees.

C. **Excellence in Service Sector Programs** (e.g., health, food service) designed to facilitate increasing competitiveness through quality care, service and support will be sought.

- **Integrated Service Delivery Systems** which feature hardware and human-based network environments.

- **Cooperative Work Experiences** designed to acclimate students to workplace needs and expectations.

- **Prototype Laboratory and Work-Experience** opportunities featuring emerging or advanced methods and applications that stress student awareness of future trends.

- **Leadership Opportunities** for students through project assignments and extracurricula activities that encourage responsible and responsive decision making.

D. **Enhanced Student Learning Opportunities** which integrate Learning Theory with Instructional Technology will be developed including:

- **Self-paced, modularized, computer-managed,** etc. instructional options facilitating flexible instructional delivery alternatives for student-directed learning of factual content and repetitive psychomotor skill applications.

- **Information databases** accessed by students through microcomputer and mainframe-based networks designed for use in laboratories, classrooms, dormitories, and at work and home.

- **"Value added" curricula** features for students, which reinforce the participative role of the worker as a decision-maker and team player, accomplished through laboratory exercises, classroom assignments, and collaborative projects for students.

- **Alternative instructional delivery systems** such as television, video tape, software, and self-paced modules.

- **Instructional development programs** for faculty and staff stressing the integration of learning theory with the application of instructional technology in the classroom and laboratory.

- **Interdisciplinary learning** opportunities for student cross-training and a more broad-based flexible graduate.

- **"Right-brain" oriented learning strategies** such as visualization, gestalt imaging, inductive learning processes, tactile applications, etc.

E. Acknowledged excellence and quality for instructional programs and services will be sought including:

- **Specialized accreditation**—ABET—for engineering technology programs (e.g., electronics, mechanical, civil, manufacturing, chemical, lasers) facilitating recognition of excellence and transfer of credit.
- **Recognition of excellence** by state and national organizations, agencies, and institutions of programs and services (e.g. automotive technology program and food service program recognitions for excellence).
- **Achievements of students** in competitive settings where skills and knowledge are performance tested against students from other institutions and employees from business and industry.

GOAL II.
Opportunity: Statewide Student Access to TSTI Programs and Services

The greatest natural resource Texas has is its available work force. To capitalize on this asset, access to quality technical education and training as well as the opportunity to seek careers in "emerging technologies" should be available to all Texans. While "world-class" technical education and training cannot be provided in every community or town, the opportunity to seek such an education by attending select institutions should exist regardless of race, sex, economic status, physical condition, prior educational achievements, or geographic location. **As the largest residential two-year public technical college in the U.S., TSTI offers a unique educational opportunity for students seeking technical careers and a significant infrastructure asset for Texas.**

A. Distance Learning Opportunities will be provided through the use of alternative instructional delivery systems such as those which are technologically-based:

- **Participation in the Bluebonnet Project** and Schoolinc, a fiber optic link along IH 35, that permits and promotes expanded transmission of data among and between institutions for educational purposes.
- **Instructional and learning alternatives** such as computer-interactive learning systems, touch screen laser-based systems, and video-taped materials provided to students located too distant from a campus or center.
- **Itinerant/mobile education and training** programs, courses, and modules for the purpose of technology infusion, technology transfer, and instructional enrichment.

B. Enrollment of Special Population Groups (e.g., disabled, minorities, displaced homemakers) will be supported, encouraged and their success facilitated:

- **Recruitment program**(s) for increased minority students (e.g., Blacks, Hispanics, disabled, displaced homemakers, displaced workers, females) enrollment.
- **Student retention** program(s) designed to support and encourage student success—graduation.
- **Admission and registration processes** (e.g., on-line registration, telephone registration) that minimize obstacles which hinder student enrollment.
- **Exchange Programs** in technical education with other countries to address international technology issues.
- **Availability of information for prospective students** of TSTI presented in multimode formats (e.g., television, radio, newspaper, magazines).
- **Availability of scholarship funds** for students in need of additional assistance, and who fail to qualify for federal or state grants.
- **Campus student housing** options increased and improved to accommodate married students, single students with children, single students desiring privacy, and the disabled who need additional provisions.
- **Recruitment efforts from urban areas** (e.g., Houston, Dallas, San Antonio)—less than 7% of total enrollment comes from cities over 150,000—to provide urban students access to the technical programs offered by TSTI.

- **Full service/Family Center oriented** child care, counseling, placement, student activities, and other services supportive of student success.

C. Instructional Alternatives and Improvements will be provided for retraining employees or displaced:

- **Project Transformation** - an 18 week worker orientation program preparatory for employees desiring upgrade training or relocation to a high technology career.

- **Part-time student** opportunities for enrollment by providing instructional programs and alternative instructional delivery formats (e.g., self-paced, evening, weekend classes) as well as options for degree and certificate acquisition.

- **Workplace literacy courses** based upon the syntax and semantics used on the work floor as a means for teaching reading, writing, computation, and communication skills.

GOAL III.
Cooperation: An Articulated Technical Education and Training System for Texas.

While Texas provides its citizens with technical education and training through community colleges, high schools and TSTI, the transferability and transportability of learned knowledge and skills among and between these institutions are limited.

The disarticulated nature of Texas technical education is further illustrated by a limited ability to quickly martial technical training resources to accommodate major training and retraining demands of industry and business.

Texas State Technical Institute sits at the apex of a triangulation (TSTI, community colleges, and high schools) of technical and vocational education program and service providers. Given its special purpose mission and role as well as statewide mandate for technical education, **TSTI can facilitate, through cooperation and collaboration, the transfer linkage between secondary and post-secondary education (e.g., high school, community college, university) and the rapid response to corporate education and training needs through a networked (human and electronic) and itinerant instructional delivery system.**

A. Secondary School Cooperation and Contracting (e.g., testing, instruction) will be sought and supported for the purpose of improving access to quality technical education:

- **Contracted technical programs** and courses mitigating the dropout problem with secondary schools through offering an alternative educational option.

- **Cooperative efforts with secondary schools** to serve special population groups (e.g., disabled, dropouts).

- **Articulated programs** (2 + 2) with secondary schools designed to facilitate advanced placement at the post-secondary level of technical and vocational program students.

B. Community College Cooperation for Programs and Services will be sought and supported where benefits accrue to the students and to the taxpayers of the state:

- **Joint ventured applied technology centers** or institutes in urban areas such as San Antonio (South Texas Advanced Technology Training Center and Houston Applied Technology Center).

- **Itinerant technical education and training** services (e.g, technology transfer, technology infusion) available to rural and urban community colleges and businesses needing specialized technical education and training.

- **Articulated programs** with community colleges providing (1 + 1) agreements and (2 + 1) opportunities for advanced technical education and training.

C. Four-Year Colleges and Universities Cooperative and Collaborative Programs and Services will be sought and supported.

- **Engineering technology alternatives** with senior institutions (e.g., South Texas engineering initiative with The University of Texas at San Antonio and Pan American University) providing increased opportunities for students seeking engineering and engineering technology

education at the two-year and four-year levels.

- **Articulated programs and agreements** with senior institutions facilitating transfer of credit for AAS degree graduates.

- **Applied research and development initiatives** with senior institutions improving the commercialization of research efforts and providing opportunities for cooperative projects between engineering and engineering technology students.

D. Networked human and electronic resources will be designed to facilitate greater exchange of information internally and externally between and among individuals, organizations, and agencies:

- **Distributed electronic information networks** that institutionally and operationally permit student experience with the use of telecommunications networks supportive of distributed manufacturing processes and other technology applications found in the integrated workplace.

- **International education and training options** (e.g., telecommunications networks, cooperative education, student exchange programs) for student enrichment as a means to facilitate comparative program and instructional "bench marking" as a means to ensure "world class" technical education and training.

GOAL IV.
Commitment: An Educational Delivery System Supportive of Texas Economic Development

The economic recovery of Texas and its future economic stability require a diverse base of business and industry complemented by a quality infrastructure of available public resources and services. For the economic development of a state, region, or city, the availability of quality technical education and training is a critical infrastructure requirement for export-based businesses.

The commercialization of scientific discoveries and research findings is directly dependent upon a quality technical work force. Small and mid-sized businesses and industries, the job growth engine for the state, are particularly impacted by an available qualified labor pool as are rural economic development efforts.

The specific commitment of an institution dedicated exclusively to technical education and training will be a significant infrastructure advantage for a state, region, or city.

Given the necessary investment of public and private resources, **TSTI is well positioned by campus location; legislative mandate; historical commitment and experience; and available facilities, equipment, and personnel resources to assist, facilitate, and lead in the economic development of Texas.**

A. Specific Competitiveness Improvement
Efforts supportive of Texas business and industry as well as local, regional, and state economic development efforts will be initiated. (The following items are representative and not inclusive):

- **TSTI-Waco Airport** development as a performing asset complementary of the educational programs and services offered on the campus and supportive of local, regional, and state economic development efforts where mutually beneficial outcomes can be obtained.

- **TSTI-Amarillo Industrial Park** development as a performing asset complementary to the the instructional programs and supportive of local, regional, and state economic development efforts.

- **TSTI-Sweetwater/Abilene/Breckenridge** flexible automated manufacturing center supportive of distributed manufacturing operations (e.g., electronic components, circuit boards) in rural locations.

- **TSTI-Harlingen/McAllen** engineering technology cooperative initiatives for economic development with Pan American University and The University of Texas at San Antonio.

- **"Full service"** (e.g., training, education, assessment, placement, consultation) contract service for business and industry which features the operation on each campus of an identifiable entity or operation responsible for rapid response to business and industry needs.

- **South Texas Advanced Technology Training Center** (STATTC) in San Antonio in cooperation with the Alamo Community College District and assisted by Texas A&M University and The University of Texas in San Antonio to facilitate aerospace, electronic, and manufacturing development.

- **Applied Technology Center** in Houston in cooperation with Houston Community College to address specific advanced technology skill needs (e.g., biotechnology, quality).

- **Bryan-College Station** and the Fayette Power Plant technical education and training project provided in cooperation with Blinn College.

- **Technology showcases** featuring prototype programs and services in the emerging and advanced technologies located on campuses and in joint ventured urban locations (e.g., San Antonio-STATTC) supportive of the Texas Department of Commerce and local economic development efforts.

- **Competitiveness Center(s)** designed to improve work floor productivity through the application of performance enhancing strategies (e.g., total cycle time).

B. Applied Academics and Workplace Literacy Instructional modules, materials, and learning environments will be acquired or developed for full-time and part-time students and for customized business and industry training and retraining:

- **Applied academics** (e.g., physics, chemistry, math, communications) curricula as an instructional alternative for students and employees.

- **Workplace-centered instructional methodologies** compatible with the learning styles of technical students and employees who generally favor a hands-on, inductive, visual, and interactive approach to learning.

- **Industry standard laboratories** necessary to prepare "work-ready" technicians.

C. Work Floor and Workplace Oriented Applied Research and Development associated with the commercialization of research and improved competitiveness will be possible:

- **"Critical massing"** of equipment, personnel, and programs in prototype laboratories and studios.

- **Cooperative projects and programs** with research universities and other identified research organizations and agencies in an effort to commercialize recent research findings for the purpose of retaining the manufacturing/processing component within the state.

- **Applied research and development** efforts stressing workplace and work related processes, procedures, and hardware/software interfaces which advance the competitiveness of Texas' industry in the production and distribution of goods.

- **Beta site testing** opportunities for equipment manufacturers, software vendors, and other export-based industries whose products facilitate or require systems integration on the work floor.

D. Itinerant Technology Infusion, technology transfer, and training opportunities for small and mid-sized businesses and rural economic development will be available:

- **Itinerant training and retraining services** and programs delivered at distant sites (e.g., rural communities, small and mid-sized towns, urban areas) by telecommunications, video-based learning sites (e.g., libraries), mobilized laboratories, etc.

- **Faculty and staff consultation** and technical assistance and technology infusion to business and industry.

- **Workshops, seminars, and short courses** supportive of business and industry (e.g., Sid Richardson Technology Transfer Lecture Series, Thomas Competitiveness Series).

E. Responsive Technical Education and Technical Assistance will be used to support the development and expansion of existing businesses and industries (primarily small and mid-sized) and the attraction of new industries:

- **Contract training** expanded to business and industries throughout the state, emphasizing the commercialization of research and organizational competitiveness.

- **Itinerant training** and development effort designed to support small and medium size businesses involved in export-based manufacturing and to help meet the critical labor shortage of larger corporations in Texas.

- **Instructional modules developed and disseminated** which use technology enhanced methods of instruction and delivery that can be used by industry on their work floor or in the workplace.

- **Rapid response capability for the delivery** of seminars, workshops, courses, degree programs, etc., supportive of identified business and industry needs which are critical to the economy of Texas.

GOAL V.
Management: An Organizational Structure and Culture Supportive of Responsive and Responsible Decision Making

As a system of technical colleges offering highly specialized technical programs and training supportive of business and industry, TSTI will implement a systems management philosophy based upon the empowerment of people to be responsive and responsible decision makers. To facilitate this management philosophy, accurate, timely and accessible management information will be available.

Entrepreneurial management styles will be encouraged to empower personnel to make timely decisions within previously approved system guidelines, policies, procedures, and planning precepts.

The TSTI organizational culture will support an action oriented approach to management which stresses accountability and encourages maximum responsiveness to "quality work force" needs for economic development.

A. <u>An Organizational Structure</u> supportive of responsive decision making and effective use of resources will be developed. This structure will be characterized by:

- **Organizational clustering** of instructional programs and services designed to critically mass the personnel, facilities, and equipment needed for exemplary program development.

- **System clustering of select activities** (e.g., resource development, fiscal management, facility planning) designed to be cost-effective, responsive, and efficient.

- **Decision making processes designed to empower** persons to make decisions to facilitate responsiveness in addressing organizational needs.

- **Networked communications**—electronic and human—between and among campuses and the TSTI System Office for information access and acquisition.

B. <u>Institutional Policies and Procedures</u> will be consistent and complete to assure compliance with federal, state, and board mandates as well as their system wide implementation including:

- **Standardization of practices and procedures** among and between campuses permitting economies of scale as well as efforts to integrate dispersed resources.

  Management Guidelines
  Personnel policies and procedures
  Financial policies and procedures
  Program policies and procedures
  Student policies and procedures

C. <u>A Positive Working Environment</u> for TSTI personnel will be achieved. This environment will stress creativity, teamwork, problem-solving and, most importantly, a student-oriented faculty and staff through:

- **Recognition of personnel** needs for security, appreciation, recognition, and professional and personal growth.

- **A nationally competitive salary** and benefit structure for faculty and staff permitting the employment and retention of quality personnel.

- **Organizational stability** through strategic planning and implementation of a shared vision and goals.

- **Professional growth and development** opportunities for all personnel supportive of a changing workplace and competitively oriented environment.

- **Empowerment of persons** with commensurate authority and responsibility to do their jobs.

- **Multimode communications** (e.g., face-to-face, electronic) between and among campuses for sharing ideas and informational services afforded students.

D. Resource Management Practices **(e.g., financial, facilities, personnel)** stressing responsible asset management practices will be promoted including:

- **Financial accounting** and management systems with accurate, timely, and accessible information.

- **Management information system** responsive to requests for data, analysis, evaluation, and forecasting.

- **Asset management planning** for institutional resources.

- **Planning and assessment** capabilities for institutional development.

GOAL VI.
Investment: Resource Attainment and Image Development for Institutional "World-Class" Status

"World-Class" status for TSTI technical education and training requires additional investments in necessary facility, equipment, and personnel resources. It also requires an image enhancement effort as well as a public awareness initiative focused upon technical education and TSTI.

Successful resource attainment is dependent upon image enhancement as a means for public awareness since operational revenues come primarily from state funding as administered by the Texas Higher Education Coordinating Board. Facility construction, and rehabilitation funds come from tuition and fee financed revenue bonds and direct state appropriations.

Public and private funding and resources will be needed for TSTI to achieve "world-class" status. **TSTI offers Texas taxpayers, businesses and industries an undervalued and unrecognized asset which, with a modest investment in resources, can provide Texas and Texans a unique educational asset and a global marketplace competitive advantage.**

A. Foundational Support (e.g., donations, gifts) for scholarships, instructional program excellence, and facilities and equipment will be secured including:

- **Scholarships for student excellence**, specific occupational needs, and special student population groups (e.g., minorities, disabled, single parents, females).

- **Excellence fund** supporting quality instruction, programs and services.

- **Specific facility/program funding** (e.g., aerospace, graphics technology).

B. Resource Development Funds supplementary to the State Funded Education and General (E&G) Budget will be secured through grants, contracts and other sources:

- **Federal, State, and Corporate grants** and contracts (e.g., Title III, NSF, NIST) for capital and operating expenses.

- **Auxiliary income** development from leased property, housing, parking, etc.

- **Managed resource attainment and allocation** through the Resource Development Office at the executive level to coordinate and promote resource attainment.

C. An Agenda for Legislative Funding and Coordinating Board resource allocation will be developed which supports attainment of the institutional vision statement including:

- **A Legislative study of facility funding** needs and revenue sources to replace and rehabilitate existing facilities.

- **Enhanced legislative funding** and Coordinating Board allocation for high technology education programs.

- **Special "Line Item Funding" Initiatives**

  - Instructional equipment upgrade.

  - Competitiveness Centers supportive of export-based industries (e.g.., aerospace, manufacturing).

  - Itinerant technology education and training.

  - Commercialization of technology—applied R & D.

  - New program startup (e.g., Hazard ous Materials, Materials Technol ogy).

  - Rural economic development (e.g., agribusiness, distributed manufac turing).

  - Applied academics and workplace literacy.

  - Educational technology/instructional materials development.

  - TSTI-Waco Airport funding.

- **Supportive "Line Item Funding"** position (TSTI would take a secondary and supportive role):

  - Houston Applied Technology Center.

  - San Antonio Advanced Technology Training Center.

  - South Texas/Valley Engineering ini tiative.

  - Secondary education exemplary technology effort.

  - Other possibilities: Dallas, Longview, Bryan-College Station, etc.

D. <u>Technical Education and TSTI Image</u> development will be stressed by:

- **Implementing a detailed marketing plan** with identified target audiences, techniques, objectives, and timing.

- **Positive working relationships** with regulatory and funding organizations and agencies.

- **Physical plant and grounds maintenance** and renovation for campus aesthetics.

- **Participation** (e.g., membership, presentations) in local, regional, state, and national meetings, committees, commissions, associations, etc.

- **An identifiable graphic, auditory, and written signature** supporting the strategic vision, goals, and objectives.

Being "World-Class": What difference does it make?

The preceding goals and strategic objectives provide the necessary initiatives needed to help distinguish TSTI as a "world class" technical college. Texas has been successful in creating "world class" research universities such as these at Texas A & M University and The University of Texas which have greatly benefited the economic development of Texas and are critically important to the economic recovery.

By "critically massing" technical education and training resources in the advanced and emerging technologies (e.g., materials technology, nuclear technology), TSTI and Texas offer business and industry work floor and production-oriented research and development opportunities directly addressing productivity and competitiveness.

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Strategic Outcomes

Following are a list of Strategic Outcomes relating to the economic development of Texas:

- **An Increased Number of Graduates from Technical Programs.** Texas presently suffers from a shortage of technicians in such fields as Chemical Technology, Aerospace Technologies (e.g., Aircraft Maintenance, Avionics, Materials Technology), Semiconductor Manufacturing Specialists, Computer Integrated Manufacturing Specialists, etc. These labor shortages will increase as Texas further diversifies its present industrial base and seeks more export-based businesses in the aerospace, electronics, telecommunications, petrochemical, biotechnical, and pharmiceutical fields.

  TSTI graduates annually approximately 900 students in high technology-related fields. Many of these students, such as in aerospace, petrochemical, and electronics areas, have several jobs awaiting them on graduation. **TSTI will expand present program enrollment capacities, initiate new programs and courses, and provide additional learning alternatives to meet present and projected manpower needs of the state.**

- **Commercialization of University/Research Lab-Based Scientific Discoveries.** An increased number of advanced and emerging technical field graduates will be essential to staffing the growing number of public and private research laboratories located in Texas as well as in facilitating the transfer of technology from the laboratory to the work floor.

  As mentioned earlier, TSTI has over 802,000 square feet of laboratory space as well as students and faculty accustomed to working in and with research-based organizations and agencies such as Los Alamos National Laboratories, Houston Area Research Center, Texas A & M Nuclear Science Center, Lawrence Livermoore Laboratories, Shell Development Laboratories and SEMATECH. For example, to date, TSTI has place approximately 300 graduates from the Laser Electro-Optics Program working in research jobs. TSTI graduates, because of their extensive laboratory experience and project-based assignments, are sought for potential supervisory positions and as employees capable of working in research-oriented or prototype environments.

  TSTI will develop prototype instructional laboratories in such areas as manufacturing, graphics, and materials capable of serving as a beta site for equipment evaluation, work floor process and procedure evaluation, and as a unique learning environment for students to better understand the systems-orientation of the new work floor and the cultural implications of such arrangments.

- **Pool of Minority Technicians.** Given the demographic trends nationally and in Texas, there will have to be a significant increase in minority participation in the work force. This is particularly true in Texas, where Hispanics are the fastest growing population group. Nationally, minority population groups have not sought scientific, engineering, or technology-related degrees.

  TSTI has been unusually successful in attracting minority enrollments into technical programs. For example, 41% or 3,400 minority students are presently enrolled at TSTI campuses. In 1988, 1,055 minority students graduated from TSTI technical programs.

  The enrollment and graduation of Hispanic students in 1988 is especially impressive since they represent 34% of the total enrollment (headcount) and 873 graduates last year.

  In a recent study of TSTI students enrolled in 1984, 50% of the Hispanic students who attended TSTI during the four-years after their graduation from high school, graduated from TSTI. Compared to the findinigs from a national outcome assessment study of vocational education conducted for the Office of Education, the rate of graduation of Hispanic students from TSTI far exceeded both the national average (19%) for all students and the average for Hispanics (21%). **TSTI will expand recruitment efforts, develop cooperative initiatives with other institutions, and improve retention efforts to increase the number of minority graduates especially in those areas of comparative under-representation such as Blacks and females.**

- **Technicians Educated and Trained in Advanced/Emerging Technologies.** Texas is experiencing and supporting business growth in export-based industries which produce and sell "value-added" or finished products. The greatest economic impact will likely come from those products which have a significant "education value" as measured in terms of production and product complexity such as satellites, aerospace products, computers, telecommunications hardware, and biotechnical products. The production of these goods require a well-trained and educated technical work force capable of leadership roles, comfortable with a changing work floor and a requirement for precision, and some operational knowledge and experience in select applications such as vacuums, cryogenics, ceramics, composities, and hazardous materials.

  TSTI has been the primary provider of advanced technicians for Texas. For example, since 1984, Texas Instruments has employed over 400 TSTI graduates. More recently, SEMATECH has populated its prototype production workfloor with 33 TSTI graduates, the largest single source of its employees. The same is true for many of the research laboratories both in Texas and outside the state.

The capacity of Texas to expand the production of advanced/emerging technicians for Texas industry is vitally important to the new export-based industries Texas is seeking to expand and attract. **TSTI will offer new programs and courses as well as modify existing curricula, as appropriate, to accommodate the emerging technical areas such as materials technology (e.g., courses in composites), hazardous waste disposal, ceramics, vacuums and cryogenics, and artificial intelligent software.**

- Technology Transfer and Technology Infusion for Small and Medium-Sized Business. As mentioned earlier in the document, small and medium-sized businesses are the job growth engine for the state. The growth, development, and survival of these businesses are largely dependent upon their ability to secure a quality work force and receive acccessible and affordable technical assistance. Many of their production and operational problems result from a lack of information and/or an inability of workers to successfully operate or apply new technologies introduced on the work floor.For these businesses, rapid technology transfer and technology infusion are essential for survival.

TSTI has an extensive continuing education program working with local businesses and industries. In 1988, more than 20,000 employees statewide were trained by TSTI faculty in almost every conceivable occupational task. Faculty and staff consulted with numerous businesses in assisting them implement new technologies to improve production and competitiveness. **TSTI will establish an itinerant education and training program to better disseminate and diffuse technological advances to businesses in Texas—both rural and urban- and to encourage increased faculty and staff technical assistance to business.**

- Technology Leadership for Texas, an Essential Infrastructure Advantage. Once dismissed as relatively unimportant when cheap and abundant labor were Texas' major assets, technical education has emerged as both a major need and opportunity for Texas. With a positive population growth rate and youthful profile of employees, Texas is well positioned for a period of sustained economic growth if the relative quality of the available and potential work force can be significantly improved.

As everyone knows, this will not happen overnight. What does have to happen is that technical education and training must be recognized as an important infrastructure issue by the state leadership and some plan-of-action endorsed and adopted to address the problem.

Competing states such as Oklahoma, South and North Carolina, Illinois, Indiana, California, Florida, Alabama, and others are strengthening their technical education system as rapidly and dramatically as possible in order to gain a competitive advantage. Applied technology centers costing in the tens of millions of dollars are springing up throughout the South and Midwest as an incentive to grow and attract business by offering showcase centers designed specifically to educate and train technical workers.

TSTI has the essential skeletal infrastructure already in place, with four campuses and three centers dispersed statewide and a recognized image among business and industry leaders for graduating superior technicians. If adequately funded, TSTI offers an incomparable infrastructure advantage for Texas over competing states. For example,

(1) TSTI is the largest residential two-year technical college system in the country,
(2) TSTI owns and operates the largest airport of any public or private educational institution in the country,
(3) TSTI has an existing asset value well in excess of $175 million given its total resources,
(4) TSTI offers some of the most advanced technical programs in the country and
(5) TSTI has one of the largest grouping of full-time (over 600) technical faculty, knowedgeable and experienced in technical applications.

In conjunction with the community colleges, four-year colleges, and research universities, the resources at TSTI are a statewide asset. The ability to showcase a system of technical colleges to prospective corporate clients

interested in relocation is an economic trump card for Texas. **TSTI will assume leadership in technical education as a flagship system of technical colleges known for quality and excellence.**

- **Technology-Enhanced Learning Advances for the Classroom, Laboratory, Office and Work floor.** Technical education and training is expensive but increasingly needed by educational institutions as well as businesses. Few budgets can afford the expensive laboratories furnished with state-of-the-art equipment and taught by knowledgeable and experienced faculty. With the expansion of knowledge and the application of new technologies, employees are continuously challenged to learn more, faster.

TSTI has developed and is continuously developing new programs and courses which are more relevant to manpower needs.

TSTI has developed and is continuously developing new programs and courses which are more relevant to manpower needs. However, curricula development represents only one part of the learning sequence—content. The other part, equally important and usually ignored, is the delivery of the content or the instructional methodology.

Computers and telecommunications offer means by which to technically enhance student learning of information. Through various instructional techniques such as simulations, gaming, graphics, animation, computer-managed instruction, etc. learning can be made both modular and portable. Laboratory costs can also be reduced in many cases where simulation is used to teach fundamental principles such as found in chemistry.

TSTI will become a national leader in developing learning materials, methodologies and technical institutional delivery systems and disseminating these advancements to other institutions and to business and industry.

Support Materials

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MANDATES FOR CHANGE

Legislative Mandate. (Education Code Section 135.01))

Greater Opportunites in Texas: A Master Plan for Vocational Education, State Board of Education, January 10, 1987.

Report and Recommendations of the Governor's Task Force on Vocational Education, January 1988.

A Strategic Economic Plan for Texas, submitted by the Strategic Economic Policy Commission to the 71st Session of the Texas Legislature, January, 1989.

Texas Work Force 2000, Prepared by the Economic Research and Analysis Department, Texas Employment Commission, 1989.

TSTI VISION STATEMENT

TSTI will be a "world-class" collegiate leader in technical education offering Texas and all Texans unique learning opportunities designed to maximize student acquisition of knowledge, values, attitudes, and skills needed for the development of a "quality workforce."

PRECEPTS

- TSTI will remain unique—a technical college.
- TSTI will retain instructionally intensive format.
- TSTI will stress service to full-time students.
- TSTI will remain residential-based.
- TSTI will offer certificates and associate degrees.
- TSTI will remain a system of technical colleges.
- TSTI will stress development of primary Campuses/Centers.
- TSTI will support economic development.
- TSTI will teach attitudes and values.
- TSTI will actively involve business and industry.

TEXAS ECONOMIC DEVELOPMENT KEY CONCEPTS

Technology Transfer.
Export-Based Industry.
Global Marketplace.
Total Quality Control.
Education Products (intelligent).
Infrastructure development.
Technology Infusion.
"Competitive Benchmarking"
Total Cycle Time.
Commercialization of Research.
Technology Convergence.
Target Industries.

ASSETS

Advisory Committees.
Single Purpose Institution.
"Critical Mass"-Facilities/People/ Programs.
Business/Industry Support-Foundation.
Extensive Student Lab Experience.
Number of Programs.
Specialized Equipment.
Success of Alumni.
Student Housing.
Unique Facilities (e.g., TSTI Airport).
Acknowledged Excellence in Technology.
Quality of Faculty and Programs.

LIABILITIES

Image and Visibility.
Ability to Serve Urban Needs.
Recognition for Excellence.
Funds for New Programs.
Facility Construction Funds.
Advanced/Showcase Programs.
Transfer of Credit for Students.
Age of Facilities.
Faculty Salary/Benefits.
Enrollment from Urban Areas.
Scholarships for Students.
Capital Equipment Funds.
Student Housing.

EDUCATION TRENDS

Renewed Interest in Learning Theory.
Technology-Enhanced Education.
Information Networks for Instruction.
International Education.
Student Engagement in Learning.
Secondary/Post-secondary Alliances. (e.g., 2+2, 2+2, 1+3,...)
Applied/Production-Oriented Research and Development.
Public/Private Education Ventures.
Student/Need-Based Modular Education.
Increased Simulation/Gaming.

NATIONAL TRENDS

Declining Anglo Birth Rate.
Fewer High School Graduates.
Global Economy.
Diversification of Economies.
Health Care Industry Growth.
Information Equals Power.
Technical Worker Shortage.
Hispanic Population Growth.
Organizational Culture Stressed.
Transnational Corporations.
Aerospace Industry Growth.
Increased Demand for Capital Goods.
Declining Military Expenditures.
Hybrid Technologies.

WORKPLACE TRENDS

Increased Worker Responsibility.
Technology Integration.
Technology Infusion.
Head not Hands Needed.
Technicians as Leaders.
Shortened Cycle Times.
Systems Orientation.
Technology Transfer.
Information-Intensive Jobs.
Teamwork.
Worker Flexibility.
Total Quality Control.

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GOALS & STRATEGIC OBJECTIVES

Quality: Exemplary Technical Programs, Services and Instruction

- Prototype Instructional Laboratories and Studios
- Emerging and Advanced Technical Programs
- Excellence in Service Sector Programs
- Enhanced Student Learning Opportunities
- Acknowledged Excellence and Quality

Opportunity: Statewide Student Access to TSTI Programs and Services

- Distance Learning Opportunities
- Enrollment of Special Population Groups
- Instructional Alternatives and Improvements

Cooperation: An Articulated Technical Education and Training System for Texas

- Secondary School Cooperation
- Community College Cooperation
- Four-Year Colleges and Universities
- Networked Human and Electronic Resources

Commitment: An Educational Delivery System Supportive of Texas Economic Development

- Specific Competitiveness Improvement
- Applied Academics and Workplace Literacy
- Work Floor and Workplace Oriented Applied Research
- Itinerant Technology Infusion
- Responsive Technical Education and Technical Assistance

Management: An Organizational Structure and Culture Supportive of Responsive and Responsible Decision Making

- Organizational Structure
- Institutional Policies and Procedures
- A Positive Working Environment
- Resource Management

Investment: Resource Attainment and Image Development for Institutional "World-Class" Status

- Foundational Support
- Supplementary Resource Development
- An Agenda for Legislative Funding
- Technical Education and TSTI Image Development

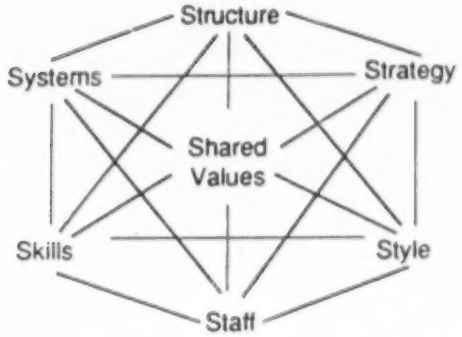
NEEDS

- Replace WWII Buildings.
- Additional Funding for Emerging Technology Programs.
- Equipment- "Retool" Existing Programs.
- Itinerant Training Capability.
- Public Information Initiative.
- Showcase Laboratories.
- Additional Scholarships for Students.
- Faculty Development/Enrichment Funds.
- Additional/Refurbished Student Housing.
- Articulation for Transfer.
- Urban Initiatives.
- Rural Applied Technology Support.
- Faculty/Staff Salaries and Benefits.

STRATEGIC OUTCOMES

- A positive image for technical education and TSTI
- Prototype instructional laboratories
- Commercialization of research
- Pool of qualified minority technicians
- Articulated technical system
- Applied academic instructional options
- Technology enhanced education alternatives
- Human and electronic—digitally-based—networks
- Technology transfer, technology infusion, technical assistance
- "Critical massing" of resources
- Rural economic development
- Centers for competitiveness
- Increased number of high-tech Graduates

TSTI Institutional Assessment Model



Assessment of Structure

- Statutorially Established Role and Mission-Facility and Operational Locations
- Organizational Structure(s): System and Campus
- Operational Programming and Services
- Funding Sources
- Instructional and Service Delivery Systems
- Regulatory and Compliance Requirements

Assessment of System

- Fiscal Operating Systems (e.g., accounting, auditing)
- Information Systems (e.g. computing, data transmission)
- Public Information System
- Student Service Support Systems
- Planning and Budgeting System
- Auxiliary Support Systems (e.g. telephone, food)
- Management Information System
- Policies and Procedures

Assessment of Strategies

- Collaboration and Cooperation
- Image Building through Leveraging
- Statutory Change in Role and Mission
- Vertical Integration through Articulation
- Agreements with other Institutions
- Special Projects, Centers, Institutes, etc.
- Economic Development Focus
- Regional Support Centers (Personnel Intensive)

Assessment of Shared Values

- Organizational Culture
- Organizational Saga
- Planning and Budgeting Processes
- Management Styles: System and Campus
- Operational Continuity
- Curricula Planning Process(es)
- Instructional Delivery System(s)

Assessment of Skills

- Organizational Responsiveness
- Organizational Flexibility
- Institutional Talent - People
- Political Acumen
- Planning and Implementation Processes
- Openness to Change
- Level of Operating Expectations
- Marketing: Organization, Program, Services, etc.

Assessment of Style

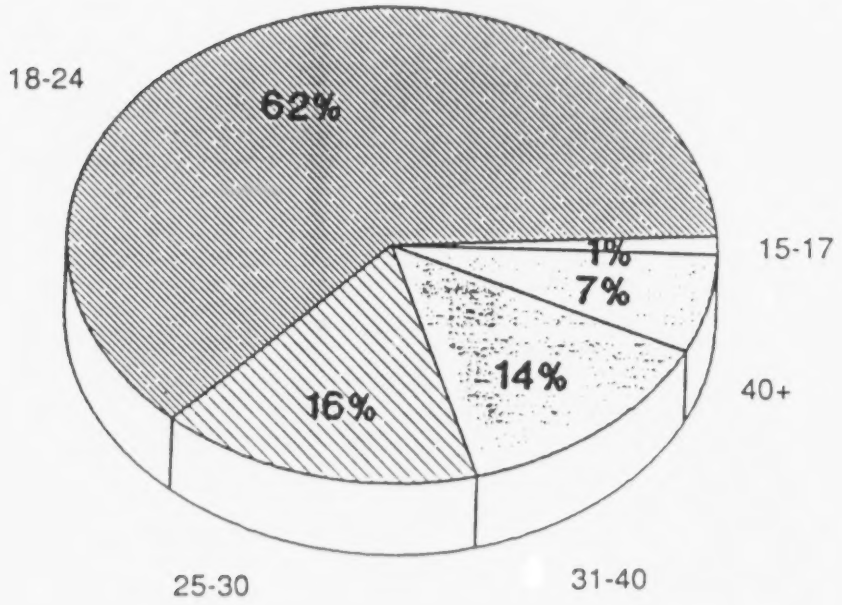
- Institutional Openness
- Reward Structure(s)
- Culture: Adversarial, Participatory, etc.
- Competitive or Collaborative Management
- Organizational Warmth
- Student Centered or Institutional Centered
- Active or Passive Decision Making
- Performance Expectation Levels

Assessment of Staff

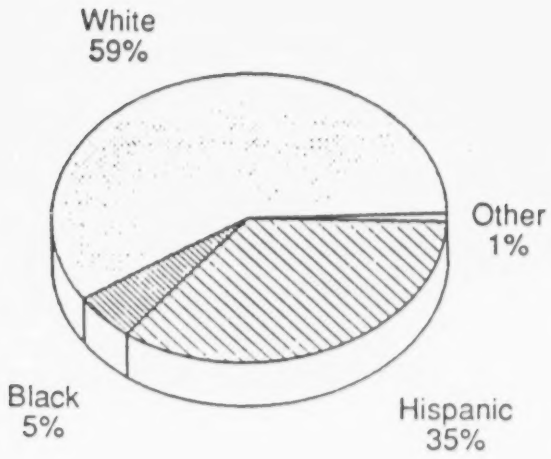
- Inventory of Personnel (e.g. credentials, titles)
- Identification of Leaders, Managers, etc.
- Special Skills Identification
- Matching Attributes and Talents to Assignment
- Organizational Structure(s)
- Formal and Informal Networks
- Organizational Culture

TSTI System Fall 1989 Headcount

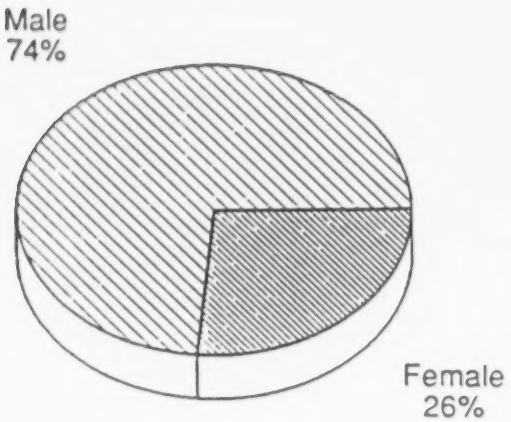
Age Distribution



By Ethnicity

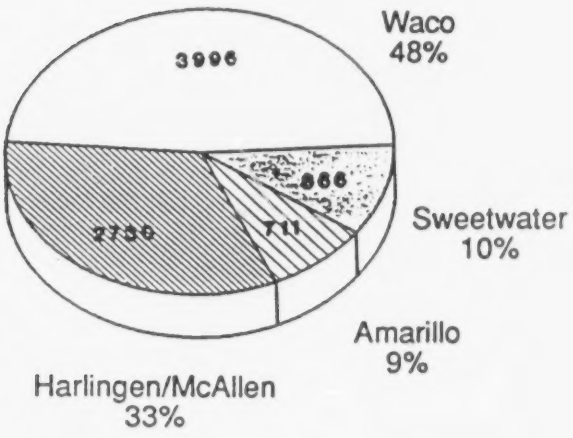


By Male/Female

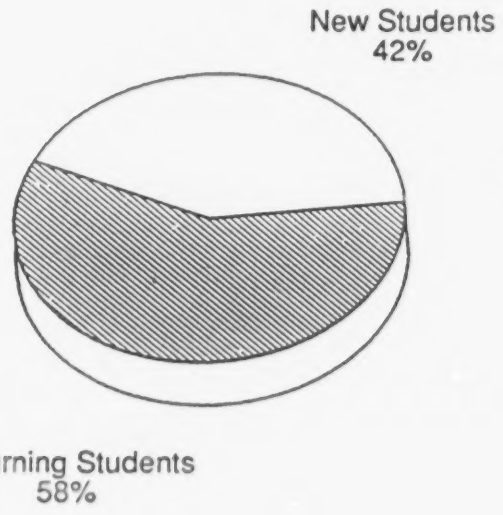


TSTI System Fall 1989 Headcount

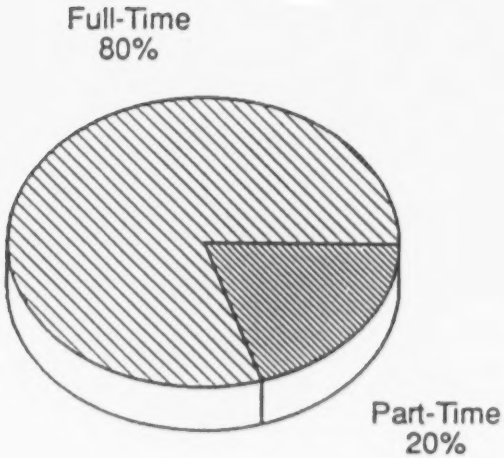
Headcount by Campus



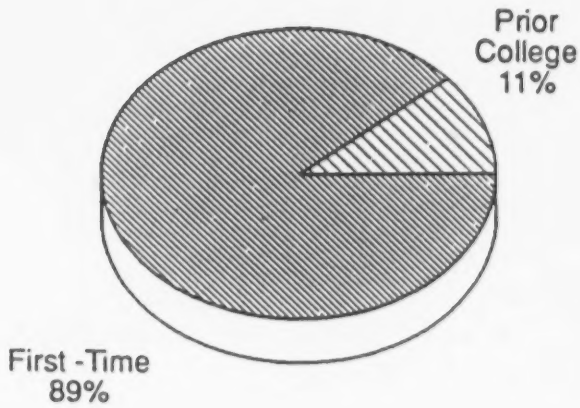
New & Returning Headcount



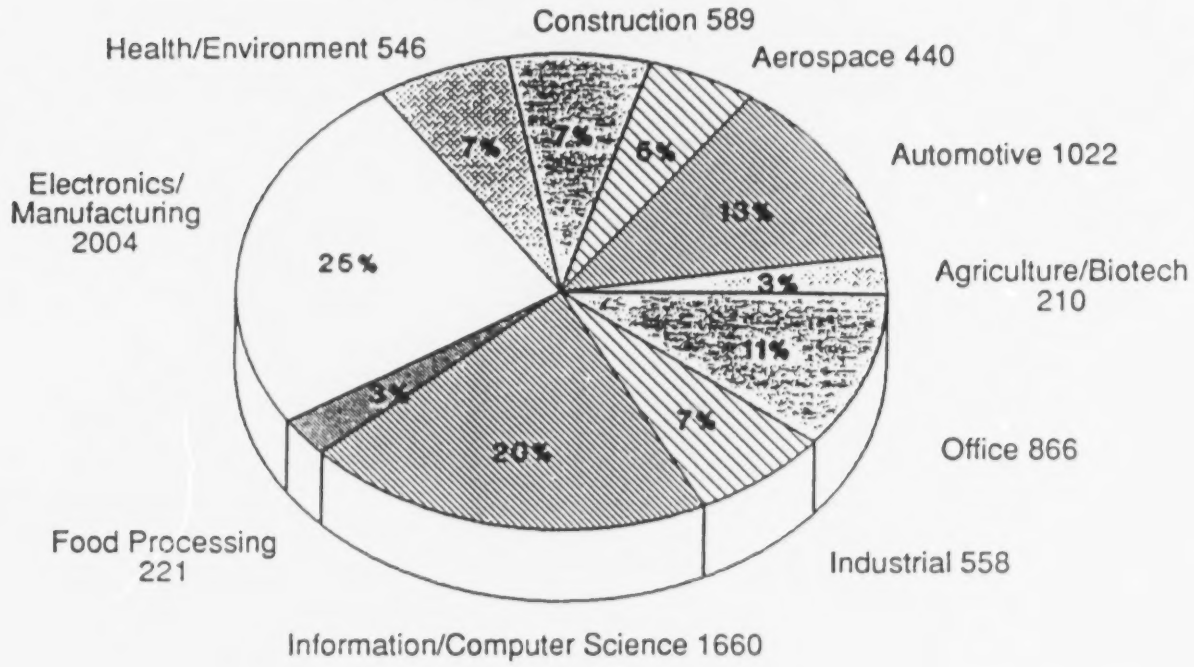
Full- and Part-Time



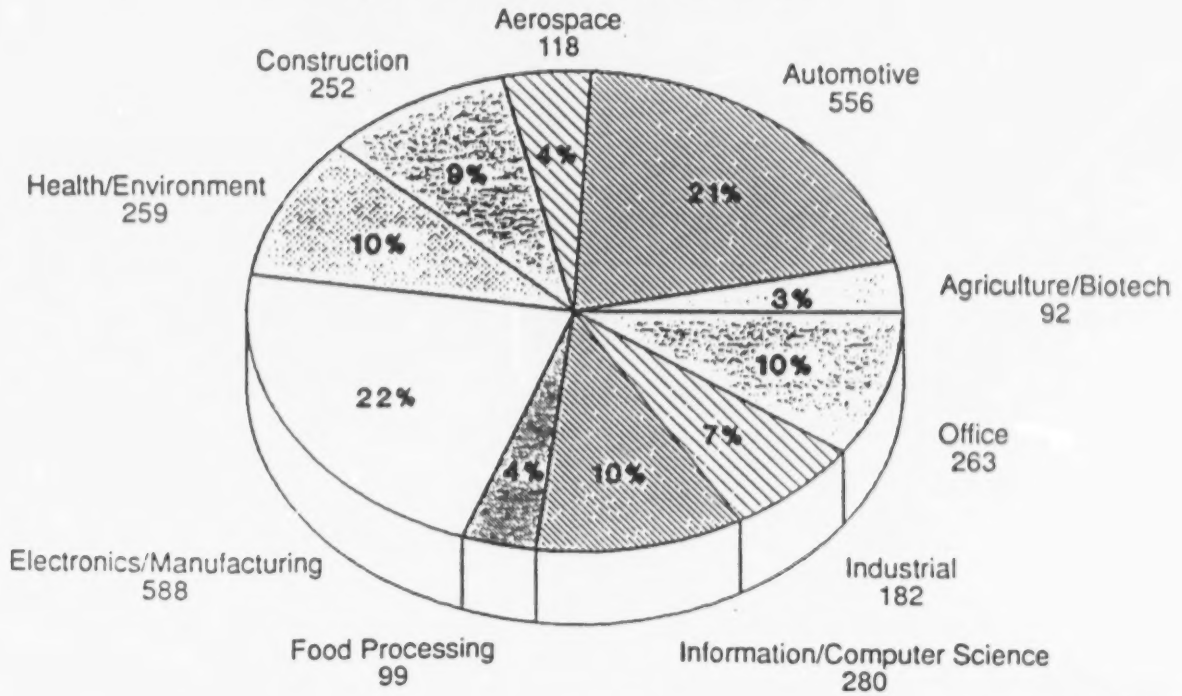
First-Time/Prior College



TSTI System Fall 1989 Headcount By Program Cluster



TSTI System Annual Graduates for 1988-89 By Program Cluster



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TSTI Programs of Study

W.....*Waco Campus*
H.....*Harlingen/McAllen Campus*
A.....*Amarillo Campus*
S.....*Sweetwater/Abilene/Breckenridge Campus*

Air Conditioning Mech. Tech.	W	H		S
† Aircraft Pilot Training	W			
Audio Visual Production	W			
Auto Body Repair	W	H	A	S
Automated Robotics Technology				S
Automotive Technology	W	H	A	S
† Aviation Maintenance	W		A	
† Biomedical Equipment Technology	W	H		
Building Construction Craft Tech.	W	H		
Business Skills		H		
† Chemical Technology	W	H		
Civil Engineering Technology	W			
Combination Welding Technology	W	H	A	
Commercial Art and Advertising	W		A	
Computer Electrical Technology			A	
Computer Maintenance Technology	W	H		S
Computer Science Technology	W	H	A	S
Dental Assistant	W			
Dental Laboratory Technology	W	H		
Diesel & Construction Equipment Mech.	W	H	A	S
Diesel & Heavy Truck Mechanics	W			
† Drafting and Design Technology	W	H	A	S
Electrical Power Distribution Tech.	W			
Electromechanical Technology		H		
Electronics Technology	W	H	A	S
Emergency Medical Technician				S

† *Indicates Fastest Growing Programs System Wide.*

Fashion Merchandising Technology				S
Floriculture/Horticulture	W			
Food Service Technology	W	H		
† Industrial Maintenance Mech.	W			
† Information Processing Technology	W	H		S
Instrumentation Technology	W	H	A	S
Interior Design Technology			A	
Laser Electro-Optics Technology	W		A	S
Livestock and Ranch Management	W	H		
Machine Shop Operations	W	H	A	S
Meat Processing and Marketing	W			
Mechanical Electrical Technology			A	
Mechanical Engineering Technology	W			
Medical Records Clerk		H		
† Medical Records Technology		H		
Nuclear Technology	W			
Nurse Assistant		H		
Occupational Safety & Health	W			
† Plant Engineering Technology	W			
Printing Technology	W	H		
Professional Truck Operations			A	
Radio Communications Electronics	W			
Supermarket Management Tech.	W			
Surgical Technician		H		
Technical Office Training		H	A	S
Telecommunications				S
Television Servicing	W			
Veterinary Technology	W			
Vocational Nursing				S

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Cecil L. Groves, Ph.D., Chancellor
3801 Campus Dr.
Waco, TX 76705
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Fall 1989
Total Enrollment: 8,303
Customized education and
training enrollment: 10,988
1988-89 Graduates: 2,689

TSTI-Amarillo

Ron DeSpain, President
P.O. Box 11157
Amarillo, Texas 79111
806/335-2316
For registration information:
806/335-2316 Ext. 246
For industrial training information:
806/335-2316 Ext. 345
Fall 1989
Enrollment: 711, 73% full-time
Special Program Enrollment: 3,696
1988-89 Graduates: 304
21% of students housed on campus.

TSTI-Harlingen

McAllen Extension Center

J. Gilbert Leal, Ph.D., President
P.O. Box 2628
Harlingen, Texas 78551-2628
512/425-4922
For registration information call: 512/425-0663
For industrial training information: 512/425-0634

Fall 1989
Enrollment 2730, 69% full-time
Customized education and
training enrollment: 3,817
1988-89 Graduates: 758
17% of students housed on campus.

TSTI-Sweetwater

Abilene Extension Center
Breckenridge Extension Center

Clay G. Johnson, Ph.D., President
Route 3, Box 18
Sweetwater, Texas 79556
915/235-7300

For registration information: 915/235-7374
For industrial training information: 915/235-7351

Fall 1989
Enrollment: 866, 82% full-time
Customized education and training enrollment: 829
1988-1989 Graduates: 238
26% of students housed on campus.

TSTI-Waco

Don E. Goodwin, President
3801 Campus Drive
Waco, Texas 76705
817/867-4800

For registration information call: 817/867-4812
For industrial training information: 817/867-4844

Fall 1989
Enrollment: 3996, 88% full-time
Customized education and training enrollment:
2,646
1988-89 Graduates: 1,389
41% of students housed on campus.

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